SECTION 5
TRANSFER SERVICES

5.1 INTRODUCTION

The transfer station and convenience center facilities are shown on Figure 1-1. This includes the Kapaa, Keehi, and Kawailoa Refuse Transfer Stations, which are owned and operated by the City. The six convenience centers are owned by the City and operated by private contractors.

On February 2, 1998, HDR performed site visits to the Kapaa and Keehi Refuse Transfer Stations. A site visit was performed at the Kawailoa Transfer Station and Laie Convenience Center on January 31, 1998. During site visits, operations were viewed and the site supervisor was interviewed. These site reviews indicated that the layout and facility designs of the stations are ample for the tonnage processed. However, are there changes that could improve efficiency or increase tonnage?

For this reason, HDR's evaluation of the transfer stations focuses on operational costs—in particular, labor and equipment usage, and the transfer truck long-haul operation. The station staffing, maintenance, and equipment expenses were reviewed and compared to other comparably sized public or private systems. Review of the transfer station operation focuses on staffing and equipment productivity and needs. Review of the transfer long-haul operations focuses on driver staffing, productivity levels, and vehicle maintenance costs. There is also a conceptual economic comparison of replacement of the existing four-compactor system at Keehi with two pre-load compactor units. Optimization strategies and recommendations are then presented.

The review of the contract-operated convenience centers is conducted in a broader sense regarding whether operational costs for the centers are consistent on the needs within the entire solid waste facility system.

5.2 FACILITY REVIEWS

5.2.1 Kapaa Refuse Transfer Station

The Kapaa Refuse Transfer Station processed an average of 200 tons per day in FY 96/97 and has experienced 450 tons per day on peak days. The facility is open seven days per week from 7:00 a.m. to 4:30 p.m. It has a long entrance road that provides ample queuing; an automated scale system; eight unloading bays; a large depressed tipping floor; and two gravity feed transfer openings at each end of the tipping floor, each equipped with articulated tamping/load leveling cranes. The waste processed on the tipping floor is, for the most part, combustible waste that is loaded in transfer trucks

for delivery to the H-POWER resource recovery facility. Non-combustible loads are transferred to the Waimanalo Gulch Sanitary Landfill.

The open side of the building is equipped with a "Z" wall elevated above the packer truck unloading area that allows manual unloading of green waste, non-combustible waste, or recyclables into roll-off bins. A roll-off truck transfers bins containing green waste to a processing area on the closed Kapaa Landfill.

All components of the station (the scale facility, unloading area, tipping floor, and transfer openings) appear sufficiently sized to accommodate peak traffic and tonnage conditions. The two transfer trailer gravity load-out chutes should provide more than adequate capacity for the peak tonnage received. The station has an adjacent maintenance facility for maintenance of transfer vehicles assigned to the facility.

5.2.2 Keehi Refuse Transfer Station

The Keehi Refuse Transfer Station processed an average of approximately 440 tons per day in FY 96/97 and 600 tons per day on peak days. The facility is open six days per week from 4:00 a.m. to 6:00 p.m. Operations are open to the public from 12:00 noon to 6:00 p.m. The long entrance road provides ample queuing. The waste processed on the tipping floor is, for the most part, combustible waste that is loaded in transfer trucks for delivery to the H-POWER resource recovery facility. Non-combustible loads are transferred from the tipping floor to the Waimanalo Gulch Sanitary Landfill.

All components of the station (the scale facility, unloading area, tipping floor, and transfer openings) appear amply sized to accommodate peak traffic and tonnage conditions. The site supervisor indicated that the cycle time for compactor and trailer loading is typically 15 minutes. The four-compactor load-out units should provide more than adequate capacity for the peak tonnage received and backup during maintenance of the compactors.

5.2.3 Kawailoa Refuse Transfer Station

The Kawailoa Refuse Transfer Station processes approximately 50 tons per day on average days and 80 tons per day on peak days. The facility is open seven days per week from 7:00 a.m. to 6:00 p.m. One shift runs the transfer operation from 7:00 a.m. to 3:30 p.m. After 3:30 p.m. convenience center operations are unmanned, except for a security guard.

The station has a long entrance road that provides ample queuing, and a remotely operated automated scale system. Only City operated disposal trucks weigh at the scale. Other commercial loads are not

accepted. The public users dispose of waste at no charge. The Kawailoa station is an open-air facility with one gravity chute equipped with an articulated tamping/load-leveling crane. The site users enter on a road that loops one way up to two elevated unloading stalls. After queuing they maneuver and back up to the transfer opening and unload waste directly into open-top transfer vehicles. Collection trucks and self-haul vehicles exit and loop back to join the two-way site entry/exit road. Transfer trucks maneuver under the load-out chute in a reverse circular loop within the loop used by City collection and self-haul vehicles. The transfer trucks merge with the two-way exit road. The site supervisor indicated that during peak periods vehicles can queue up for significant distances; however, the entry road is long enough to prevent queuing back to the main road. During a site visit on Saturday, the facility maneuvering space appeared adequate; however, during peak periods of queuing, City collection or transfer trucks may have to wait in line.

5.2.4 Convenience Centers

The convenience centers typically are paved fenced sites. The centers generally have a drive-through, U-shaped ramp about 4 feet above grade next to roll-off bins. Users enter the facility and are recorded on a log sheet and directed by the attendant, and then queue and proceed up the ramp where they manually deposit their waste into the bins. They then descend the ramp and loop back out to exit the facility. The Wahiawa and Laie centers are equipped with compactors for combustible loads that are transferred to the H-POWER plant.

The Laie center was viewed by HDR during Saturday operations. It had four roll-off bins within the ramped loop, which were used for mixed refuse that contained non-combustible materials. A compactor unit was also located off of the ramp for fully combustible loads that were to be transferred to the H-POWER facility. Along the perimeter of the road loop there were two bins for source-separated green waste and areas where tires and white goods were separately deposited.

5.3 SYSTEM PRODUCTIVITY AND GOALS

5.3.1 Annual System Costs

The annual transfer station system costs are shown in **Table 5-1.** The figures are based on total system costs allocated to the different stations, as noted. Reports that allocate costs by site were not available in Refuse Division accounting records, so costs were prorated to each site as shown in the table notes. System tonnage and cost data are included in Appendix A.

It should be noted that **Table 5-1** shows the unit cost of $50/ton for Kapaa calculated using approximately 73,000 tons of waste that is long-hauled for disposal. The transfer operation also includes transfer of approximately 25,000 tons of green waste to compost operations on the adjacent

closed Kapaa Landfill. When these tonnages are combined to 98,000 tons and applied to the overall station cost shown, the calculated unit cost drops from $50/ton to roughly $37/ton. The operations staff for the Kapaa Refuse Transfer Station also share duties assigned for landfill post-closure sampling.

Table 5-1
Annual Transfer Station System Costs

	Note	Total FY 96/97	Kappa	Keehi	Kawailoa
Approx. TPD		686	200	439	47
Transfer Station Expenses:					
§ Direct Salaries and Wages	1	$2,445,160	$1,074,388	$1,111,436	$259,335
§ Labor Fringe Costs	1	1,118,528	491,474	508,422	118,632
§ Indirect Costs – Refuse Division	2	486,504	213,767	221,138	51,599
§ Current Expenses	2	790,638	347,402	359,381	83,856
Subtotal		$4,840,830	$2,127,031	$2,200,377	$513,421
Vehicle/Equipment Maintenance:					
§ Labor Costs	3	$ 288,418	$117,580	$ 163,233	$ 7,335
§ Labor Fringe Costs	3	108,417	44,300	61,359	2,757
§ Indirect Costs (AES)	3	212,363	86,773	120,189	5,401
§ Other O&M Costs	3	633,390	258,808	358,472	16,109
Subtotal		$1,242,588	$ 507,732	$ 703,253	$ 31,603
Capital Cost Recovery:					
§ Equipment	4	$ 532,516	$ 216,951	$ 249,822	$ 65,743
§ Facilities	5	1,591,799	809,831	700,369	81,599
Subtotal		$2,124,315	$1,026,782	$ 950,191	$147,342
TOTAL		$8,207,733	$3,661,545	$3,853,821	$692,366
Approximate Tons Transferred	6	226,920	72,940 [97,940]	136,853	17,127
Approximate Cost Per Ton	6	$ 36	$ 50 [$ 37]	$ 28	$ 40

Notes: See Appendix A for Refuse Division data. The costs for each station is allocated from total station cost data, split as follows:

1. Authorized positions in 1998 minus unfilled positions plus non-holiday overtime.
2. Split between each station apportion by staffing.
3. Split of maintenance cost from 7/1/97 to 2/11/98 reported by AES.
4. Total number of trailers, tractors, and loaders worked on by AES 7/1/97 to 2/11/98.
5. FY 96/97 Capital Costs per Station from Refuse Collection and Disposal Cost Data.
6. Cost per ton for Kapaa is reduced to approximately $37/ton if 25,000 tons of green waste transferred to composting is included.

5.4 REVIEW OF OPERATIONS

5.4.1 Kapaa Refuse Transfer Station

5.4.1.1 Current Staffing and Equipment

The Kapaa Refuse Transfer Station assigned operating staffing and associated assigned equipment are currently authorized as shown in **Table 5-2.** The facility receives waste from 7:00 a.m. to 4:30 p.m. Transfer truck drivers each work 10-hour days, four days per week. A description of the typical day staffing and a weekly staffing matrix for the facility is located in Appendix A.

Table 5-2
Kapaa Station – Authorized Operations Staff and Equipment

Staff	Total	Typical Shift	Equipment	Pieces
TS/LF Supervisor II	1	1		
TS/LF Supervisor I	2	1		
TS Equipment Operator	8	*3-5* 1 1 1 1 1	Total as itemized below Loader (includes 2 spares) LF Maintenance and sweeping Knuckleboom cranes Leachate Pumping Driver (hvy. days or roll-off)	 3 1 2
Heavy Truck Driver	13	5-6	Tractors Trailers Roll-off trucks	14 12 2
Laborer II	4	2		
Scale Attendant	2	1	Automated Scale	1

Station staffing ranges from three employees on weekend days to five or six employees during the week. Employees operate one wheel loader, one of two knuckleboom cranes, the landfill leachate pumping system, and, on heavy usage days, one transfer/roll-off vehicle. Employees also perform miscellaneous housekeeping and maintenance duties at the transfer station and the landfill. Three to six additional employees operate the transfer fleet (three on Sundays and six on Wednesdays through Fridays). In addition, one scale attendant per day is employed, except two are employed on Tuesdays.

5.4.1.2 Optimal Staffing and Equipment

Based on typical productivity and experience with private transfer station operations, HDR estimated the optimal numbers of staffing and equipment for the Kapaa Refuse Transfer Station, as shown in **Table 5-3.**

Table 5-3
Kapaa Station – Optimal Operations Staff and Equipment

Staff	Total	Typical Shift	Equipment	Pieces
TS/LF Supervisor II	1	1		
TS/LF Supervisor I	2	1		
TS Equipment Operator	8	5	Total as itemized below	
		1	Loader (includes 2 spares)	3
		1	LF Maintenance and	1
		1	sweeping	2
		1	Knuckleboom cranes	
		1	Leachate Pumping	
			Driver (hvy. days or roll-off)	
Heavy Truck Driver	13	5-6	Tractors	10
			Trailers	11
			Roll-off trucks	2
Laborer II	4	2		
Scale Attendant	2	1	Automated Scale	1

5.4.1.3 Station Operation

The estimated optimal staffing requirement is estimated to be the same as current staffing for transfer station functions. Tonnage data for FY 96/97 (Appendix A) indicates that 72,940 tons, or 200 TPD on average, was transferred. An additional 25,000 tons of green waste were handled, which includes processing through the transfer station. Refuse Division staff indicated that peaks up to 450 TPD may be experienced. One loader should be able to process 200 to 450 TPD. Relief could be provided from the other assigned operators. Typically, the knuckleboom crane operator can move between each of the two openings, whichever is in use. The landfill duties, leachate pumping and other landfill maintenance were not analyzed.

5.4.1.4 Transfer Hauling Operation

A calculation sheet, *Transfer Station Route-Time, Staffing and Equipment Levels*, is included in Appendix B. The sheet estimates the transfer truck and driver requirements for average (assumed 270 TPD with green waste) and peak days (assumed 450 TPD). The calculations indicate that four trips per day are achievable for drivers and represent good productivity. Under these conditions, average payloads of 17.5 tons would require four drivers for the average 270-TPD day. On peak days assumed to be 450 TPD, 17.5-ton payloads would require seven drivers and 18.8-ton payloads require six drivers. This appears consistent with the staffing which shows an additional driver for heavy days.

The site visit and interview indicated that 17 tons is the typical target payload for the transfer station operation. This appears low compared to typical operations. The achievable payload is a function of waste density and truck capacity; however, open top transfer operations can achieve a continuous payload of up to 20 tons. With the storage capacity of the tipping floor for peaks, it is possible that targeting an average of 18.5 tons or more would reduce the number of trips such that the additional seventh driver shown would not be required for peaks. In addition, overall fuel costs would be reduced due to reduction in trips.

Refuse Division staff indicated that targeting 18.5 tons under current conditions would risk overweight axles. Staff have indicated that this is partly due to the fact that they have greatly reduced aggressive use of the articulated crane because it was damaging trailers. This trailer damage is believed to be from blind spots with the current crane position. A repositioning is planned which may decrease this problem to allow more load leveling and consistently higher payloads than 17 tons.

5.4.1.5 Transfer Trucks

There are 14 tractors and 12 trailers assigned to Kapaa. The availability figure for equipment for this yard is given as 43 percent (see Appendix A). Assuming a potential of 12 operational rigs, if 43 percent were available only five would be on the road. This is barely the minimum needed to process the average day, but inadequate for peak days. Improvements would need to be made to attain an availability of 60 percent to handle peak days. Industry standards are typically on the order of 75 percent or better for transfer fleets. If roughly 75 percent availability were obtained, 10 trucks and 12 trailers would be assigned (two additional spare trailers).

Staff expressed concern that the availability problem at Kapaa has stemmed from units being out of commission for long periods from accidents. Also, units at Keehi receive quicker preventive

maintenance and service than Kapaa because there are two dedicated transfer station mechanics rather than the Kapaa shop dealing with many other collection vehicles. This problem should be analyzed with AES to determine better methods for increasing the availability at Kapaa.

5.4.2 Keehi Refuse Transfer Station

5.4.2.1 Current Staffing and Equipment

The Keehi Refuse Transfer Station operating staffing and assigned equipment are currently authorized as shown in the **Table 5-4.** The Keehi station is open for 14 hours per day. A "skeleton" crew starts operations at 4:00 a.m. for early city collections. A "full" crew is assigned to start at 6:15 a.m. A lighter crew starts at 10:30 a.m. to work until daily closure at 6:00 p.m. Fewer staff are assigned on Sundays to serve only the public. A description of the typical day staffing and a weekly staffing matrix for the facility is included in Appendix A.

Table 5-4

Keehi Station – Authorized Operations Staff and Equipment

Staff	Total	Main Shift	Equipment	Pieces
TS/LF Supervisor II	1	1		
TS/LF Supervisor I	2	1		
TS Equipment Operator	6	5 3 2	Total as itemized below Loader (each early/main/late shift) Compactors	 4 4
Heavy Truck Driver	10	8	Tractors Trailers	17 20
Laborer II	1	1		
Scale Attendant	3	1	Automated Scale	1

Station staffing ranges from seven to eight total employees per day over several shifts. Except for Mondays, one loader operator begins work at 4 a.m. and works until 12:30 p.m. During the week, four to five employees work the 6:15 a.m. to 2:45 p.m. shift operating the wheel loader and two compactors, as well as performing general cleanup and housekeeping activities. On Saturdays, three employees perform these functions. On Tuesdays and Thursdays, one additional employee works from 10:30 a.m. until 7:00 p.m., whereas the rest of the week, two employees work this late shift. Three scale attendants and three supervisors work staggered shifts on Tuesdays, Wednesdays, and

Fridays. Two attendants and two supervisors work on Mondays, Thursdays, and Saturdays. The station is closed on Sundays.

Eight transfer vehicle drivers work 8-hour shifts each day except on Tuesdays, where 10 drivers are employed.

5.4.2.2 Optimal Staffing and Equipment

Based on typical productivity and experience with other transfer station operations, HDR estimated the optimal numbers of staffing and equipment for the Keehi Refuse Transfer Station in **Table 5-5.**

5.4.2.3 Station Operation

The FY 96/97 tonnage data show 136,853 tons were transferred. This is an average of approximately 440 TPD over six days per week. Refuse Division staff indicated that peak days are as high as 600 TPD.

The station operations staffing of overlapping three shifts of operators appears efficient, assuming that when multiple operators overlap they can perform relief or other functions, such as maintenance and sweeping. One loader should be able to process 440 to 600 tons in a 14-hour operating day. Compactor operation requires that an operator run the equipment to finish compaction and load the refuse into the transfer trailer at the end of the load process. If truck drivers were trained and categorized under union rules to operate the compactors, they could perform this function. Assuming that generally 28 loads are transferred in a day, a total of two to three loads per hour of compactor production would be required among the compactors in use. Optimized operations would have truck drivers perform compactor operation, which would eliminate the need for two compactor operators.

The reclassifying and paying drivers to be equipment operators would require an additional $1,580 per year per driver ($26,916 in annual salary compared to $25,344) plus training costs. This also may be a broader issue than just reclassifying the 10 drivers at Keehi, if this would be a system-wide change. Although the retraining requirements to run compactors and close trailer doors at Keehi are not significant and salary cost would be saved, this may be a more complicated union issue.

Table 5-5

Keehi Station – Optimal Operations Staff and Equipment

Staff	Total	Typical Main Shift	Equipment	Pieces
TS/LF Supervisor II	1	1		
TS/LF Supervisor I	2	1		
TS Equipment Operator	6	3 3 0	Total as itemized below Loader (each early/main/late shift) Compactors	 4 4
Heavy Truck Driver	10	7	Tractors Trailers	10 12
Laborer II	1	1		
Scale Attendant	3	1	Automated Scale	1

Operations that use pre-load compactors rather than the older style units at Keehi achieve higher payloads and also allow the loader operator to operate the compactor by remote control. This would allow the driver to only be responsible for closing the door after the load is extruded and may simplify this issue. Section 5.4.2.6 contains a comparison of pre-load compactor technology to the existing compactor system.

5.4.2.4 Transfer Hauling Operation

A calculation sheet, entitled *Transfer Station Staffing and Equipment Levels*, is included in Appendix B. This sheet lists and calculates the transfer truck and driver requirements for average and peak days. The calculations indicate that four trips per day over an 8-hour day might be tight, considering traffic. The Refuse Division supervisory staff has an understanding with drivers that, if they complete four loads in a day they can leave. Therefore, the staffing plan indicates that four trips per day are targeted. Under these conditions, average payloads of 17 tons would require seven drivers for the average of 440 TPD day. If the average payload were 18.8 tons per load, six drivers providing four trips per day would be required. On peak days assumed to be 600 TPD, 17-ton payloads would require nine drivers. This differs somewhat from the staffing, which shows eight drivers in general and 10 drivers for a heavy day.

Site overtime reports (Appendix A, FY 1996/97) indicate that roughly six man-years of non-holiday overtime were spent at the Keehi station. This may be because productivity may actually vary between three and four loads per day without overtime. A contributing factor may also have been unusual illness or injury time off during this period. Currently, two authorized operator positions are unfilled at the station, but driver positions are filled.

5.4.2.5 Transfer Trucks

There are 17 tractors and 20 trailers assigned to Keehi. The availability figure for equipment for this yard is given as 75 percent. Assuming a potential of 17 operational rigs, if 75 percent were available, 12 would be in service. This exceeds the 10 trucks that may be required for a peak day if four loads per driver per day are transferred.

5.4.2.6 Transfer Technology

The site visit and interview indicated that 17 tons is the typical target payload for the transfer station operation. This appears low compared to typical operations; however, the reason given is that greater load densification in the rear portion of the trailer from the compactor has caused problems with 18- or 19-ton payloads, resulting in overloaded rear axles. This is not uncommon for the style of compactor employed, which may produce higher density as the latter portion of the load is pushed into the trailer. Triple axles have been installed on the trailers to eliminate axle load problems.

Optimal conditions are achieved by maximizing payloads. The current types of compactors, which are up to 20 years old, have been replaced by pre-load compactors at many sites to increase payload on the order of 20 to 24 tons per load. This can also reduce trailer maintenance costs (costs for Keehi trailer maintenance is unusually high as discussed below in this report).

A preliminary assessment comparing the current system to installation of a pre-load compactor(s) is included in Appendix C. Only transfer hauling costs judged to vary if the project were implemented are included. The comparison is summarized in **Table 5-6.**

Table 5-6

Keehi Transfer Station Comparison of Transfer Haul Costs for Current System vs. New Preload Compactors

	Current	Preload	Key Elements
Basic System Variables			
Transfer Tons Per Year	140,000	140,000	Keehi FY 96/97 data
Transfer Tons Per Day (Average)	450	450	Six-day-per-week operation
One-Way Haul Distance	23	23	To H-POWER
Average Payload	17.0	21.5	Current vs. Optimal Preload
Trucks in Service (Average Day)	7	5	Service Average Day – does not includes spares
Number of Compactors	0	2	Replace existing with 2 AMFAB TP-500
Operations Staff (Typical Day)	5	3	Eliminate need for two Compactor Operators
Annual Costs			
Haul Costs:			
§ Fleet Debt	$ 181,300	$ 125,000	Reduction of one transfer truck
§ Driver Costs	415,800	310,000	Reduction in driver hours
§ Truck O&M Costs	590,100	330,500	Current $1.41/mile reduced to $0.97
Station Capital Costs:			
§ Debt on Compactor	$ --	$ 301,442	Two preload units plus $300K installation work
§ Operations Labor Cost	247,500	148,500	Typical day reduced from five to three operators
§ Compactor Maintenance	100,000	150,000	Four x $25K – Two x $75K for preload
Total Annual Costs	**$1,534,700**	**$1,365,442**	

The analysis shows that replacing two existing compactors with newer preload compactors would save roughly $170,000 (11 percent) per year. The comparison conservatively assumes that there is no capital depreciation cost for the existing compactors. The conversion would require that lighter trailers would be phased in to obtain an average of 21.5 tons per trip.

The analysis judges that the very high current trailer maintenance costs (see Section on "Vehicle Maintenance Costs") would be reduced to more normal levels because the stresses from a preload compactor would be less than the trailer stresses from the current compactors. It is assumed that the current trailer maintenance cost of $0.69/mile **(see Table 5-11)** would be reduced to a more typical cost of $0.25/mile.

Another key cost reduction assumption is that a preload compactor would eliminate the need for the current two compactor operators because the preload compactors could be run by remote control by the loader operator. However, if the Refuse Division were to retain the existing compactor system and can reclassify drivers to run the existing compactors (thereby also eliminating the need for the existing two compactor operator positions), the cost savings is reduced to $70,000 per year, or only 5 percent.

Two 100 HP units rated at roughly 50 tons-per-hour[2] (used in the economic analysis above) would meet the stations need including maintenance downtime with some operational contingency. The viability of a project to replace the existing compactors with preload compactors would also depend on detailed checking of the structure to ascertain whether the units could be installed within the assumed total building structural cost of $300,000. HDR's contacted compactor manufacturers to assess whether pre-load compactors could be installed in the compactor areas and load-out chutes at the existing station without major structural modifications. The exiting load-out chute is closer to the station wall than the typical pre-load models fit. However, one manufacturer indicated they were developing a two stage telescoping cylinder model that could be installed in the existing station to fit the existing load out chutes. This will require that the hydraulic unit for the new compactor(s) be located behind an existing adjacent unit (if it were to be retained for backup) or in an open area after the existing units are removed. Relocation of axle scales may also be required.

[2] Telephone conference with SSI Shredding systems Inc., April 20, 1999.

5.4.3 Kawailoa Refuse Transfer Station

5.4.3.1 Current Staffing and Equipment

The Kawailoa Refuse Transfer Station operations staffing and assigned equipment are currently authorized as shown in **Table 5-7**. One crew operates the station from 7:00 a.m. to 3:30 p.m. A description of the typical day staffing and a weekly staffing matrix for the facility are in Appendix A.

Table 5-7

Kawailoa Station – Authorized Operations Staff and Equipment

Staff	Total	Typical Day	Equipment	Pieces
Lead TS Equipment Operator	1	1		
TS Equipment Operator	2	1	Knuckleboom crane	1
		1	Misc., clean, truck jockey	
Heavy Truck Driver	3	2	Tractors	4
			Trailers	4
Scale (attended by operator)	0	0	Automated Scale	1

5.4.3.2 Optimal Staffing and Equipment

Based on typical productivity and experience with private transfer station operations, HDR estimated the optimal numbers of staffing and equipment for the Kawailoa Refuse Transfer Station as shown in **Table 5-8.**

5.4.3.3 Current Conditions

Approximately 17,127 tons were transferred in FY 96/97. This is approximately an average of 47 TPD transferred over a seven-day week. Refuse Division staff indicates that peak days are approximately 80 TPD.

The typical daily station staffing includes three operators (including lead) and two drivers. Currently, one authorized driver position is vacant. The traffic typically includes eight to 10 collection trucks per day, which must be weighed during Monday through Saturday operations. The existing scale system requires that an operator located up in the load-out area, not visible from the entry scale, record these transactions in a computer. This takes that operator away from other duties. Other duties of operators are to direct traffic, run the knuckleboom crane to level loads, and jockey trucks when trailers are full if a driver is not present. Although the peak tonnage occurs during the week, peak traffic numbers may occur on weekends from heavier public traffic.

Table 5-8

Kawailoa Station – Optimal Operations Staff and Equipment

Staff	Total	Typical Day	Equipment	Pieces
Lead TS Equipment Operator	1	1	(Available for performing or relief for knuckleboom or to jockey trucks)	
TS Equipment Operator	2	1 0	Knuckleboom crane Misc., clean truck jockey	1
Heavy Truck Driver	3	2	Tractors Trailers	4 4
Scale (Attended by Operator)	0	0	Driver recorded weights, logged and entered by Lead Operator at end of day.	1

The site visit during Saturday operations indicated that the public users were aware of the queuing and unloading procedures. They typically watch the user in front of them unload or follow signs. The busiest time may be when the operator must weigh in collection trucks arriving from routes about the same time and level loads and jockey trucks.

Currently two of the three driver positions are filled. The staffing matrix indicates Monday, Tuesday, Wednesday, and Saturday have two drivers working; Thursday and Friday have one driver; and Sunday has none assigned. Estimated route times indicate that three loads could be transferred in a day with approximately one-hour contingency. The actual payloads may vary below a full load at the beginning of a day, which may tend to reduce the average payload.

5.4.3.4 Optimal Staffing

Optimal staffing could be achieved if drivers and operators were cross-trained. This would eliminate the need for the currently authorized third driver position by sharing the available production of both the second driver and second operator. This is explained below.

An average of 60 TPD would require four loads per day (average of 15 tons). This requires one driver to work overtime for the fourth load or to store the load in a trailer for transfer by a two-driver shift the next day. Trip time calculations indicated that the second driver assigned would typically have four to six non-driving hours for peak and average days, respectively. This time could be used for operations.

The five-day workweek requires three operator positions to typically provide two operators to cover the seven-day operation. Staffing by two operators allows free time for operators during the day. Because there are so few scale transactions (average of nine per day), operators could also gain freedom during peaks by having weigh/data equipment installed to enable automatic weighing of loads or drivers could manually record data at the scale (manual recordings could be entered at the end of the day). The free time could be used to transfer a load during days when only one driver is assigned.

5.4.3.5 Transfer Trucks

The station currently has four trucks and four trailers assigned. This allows coverage of peak days and maintenance requirements. The relatively low maintenance costs discussed in the section below titled "Vehicle Maintenance Costs" appear to indicate this number is effective.

5.4.4 Convenience Centers

Table 5-9 summarizes the current cost for the six convenience centers. The average unit cost for operation in FY 96/97 was approximately $71 per ton. The cost per center ranges from $56 to $93 per ton. The highest cost stations were Wahiawa and Ewa, both of which had tonnages below the average for the centers. The overall cost for the convenience centers was approximately $69 per ton according to the FY 94/95 Cost Study, and therefore has not increased significantly.

These unit costs are above the unit costs for operation of typical transfer stations, as expected due to economy of scale. The convenience centers accounted for transfer of approximately 13% of the total waste that was moved through the entire transfer system (both the convenience centers and transfer stations) in FY 96/97. During that period they accounted for approximately 23% of the total transfer system costs.

Table 5-9
Cost and Summary Information on Convenience Centers

Cost Allocations (Based on 96/97 Cost Study)	Ewa	Laie	Waianae	Waipahu	Wahiawa	Waimanalo	Totals
EXPENSES							
Direct Salaries and wages	$56,107	$29,895	$56,107	$56,107	$29,895	$29,895	$258,004
Labor Fringe- salaries and wages	$39,674	$21,139	$39,674	$39,674	$21,139	$21,139	$182,438
Indirect costs- Refuse Division	$8,556	$8,556	$8,556	$8,556	$8,556	$8,556	$51,334
Current Expenses	$196,044	$310,981	$201,309	$393,119	$273,731	$327,213	$1,702,398
CAPITAL RECOVERY							
Facilities	$19,736	$56,985	$16,819	$15,532	$44,259	$18,916	$ 172,246
Equipment	--	--	--	--	--	--	--
TOTAL CENTER COSTS	$320,117	$427,555	$322,465	$512,987	$377,580	$405,718	$2,366,421
Total Tons (FY 96/97)	3,815	5,334	5,720	7,577	4,080	7,027	33,553
Tons Per Day (Total/365)	10	15	16	21	11	19	92
Cost per Ton	$83.91	$80.16	$56.37	$67.70	$92,54	$57.74	$70.53
Nearest Facility	WG Landfill	Kawailoa TS	WG Landfill	Keehi	Kawailoa	Kapaa	
Distance to Nearest Facility (mi)	6	13	8	9	11	5	
Additional $/ton @ Nearest Facility	10	57	10	20	57	20	
Cost Savings Per Ton	$73.91	$23.16	$46.37	$47.70	$35.54	$37.74	
Calculated Savings Per Year	$281,967	$123,517	$265,265	$361,447	$145,020	$265,178	$1,442,393

Field review of the Laie convenience center was performed during site visit of the transfer stations by HDR. During this site visit, the operations at Laie indicated the facility has an efficient layout and is functioning well. The attendant staffing appeared appropriate.

Review of data for all the centers indicated that the average outgoing transfer load was approximately 3 tons. The waste is generally transferred in 40 CY bins. HDR believes that the City should regularly monitor the attendants/security guards to ensure that the bins are properly managed to maximize the volume of waste in each bin. Full bins could reasonably be expected to have achieve a load density of 200 to 300 lbs/CY, which would yield 4 to 6-ton payloads for 40 CY. It should be noted that the bins are transferred in cycles, which does allow for transfer of full bins in many cases. However, if the site attendant could manage the filling of bins to the maximum possible, cost savings could be realized. If the attendants were able to oversee efficient loading of materials and also minimize the transfer of partially loaded bins, the 3-ton average payload should go up. Because the Contractor is paid by the load, this could cut hauling expenses, which were 71% of the current expenses and 51% of the total convenience center system costs in FY 96/97. For example, an increase in payloads which would result in a 20% decrease in number of loads and hauling costs would reduce the overall system cost by approximately 10%, from an average of $70.53/ton to $63.33/ton.

The convenience centers provide a free, easy-to-use service close to the residential users. HDR understands, from discussions with the City, that the service is popular with the users. For this reason, the City could decide to continue the service, despite potential cost savings if they were not operated.

The issue of whether to incur the costs for the centers is dependent upon weighing the benefits of convenience for users and potential reduction in litter, against the loss of these benefits if the centers were not available. The residences also have curbside service for bulky items in addition to the twice-a-week refuse pickup described earlier. This may not be as convenient as the centers, but, combined with the transfer stations for self-haul users, these services could adequately serve waste disposal needs of residents. City staff have also indicated they believe that some site users are commercial users and not residential. One indicator is that many of the white goods have parts removed, which are typically only performed by commercial operations.

Table 5-9 lists the distance to the nearest transfer station or disposal facility that also could serve self-haul users of the convenience centers. In theory, if the centers were closed, users would be able to use these facilities for self-haul waste. Laie and Wahaiwa are 13 and 11 miles from the Kawailoa Transfer Station, which are the farthest distances. This would require significant additional travel

time compared to the centers. In addition, if all of the 9,400 tons of waste from these centers were passed through the Kawailoa Transfer Station, it would increase the 17,200 tons of waste transferred through Kawailoa in FY 96/97 by 55%. This would likely occur primarily during the existing self-haul peaks at the transfer station, and therefore might not be practical.

For the other convenience centers, use of the other nearest facilities shown in **Table 5-9** would have less impact because they are closer to the centers or the increased traffic would not be as significant. However, traffic encountered from Waipahu to Keehi could result in significant additional time, even though the driving distance is only 9 miles one way.

If the City were to consider closure of centers to save costs, the most practical candidate would be Waimanalo, because of the proximity to Kapaa and the fact that Kapaa could probably handle the traffic and waste without a significant cost increase at the station, other than long-haul costs plus a minor increase in operations costs. Conservatively assuming $20 per ton for these additional costs at Kapaa, the savings on 7,000 tons per year currently costing $58/ton at Waimanalo would be approximately $265,000 in a year.

A similar analysis for closure of all the centers indicates potential significant cost savings. The bottom portion of **Table 5-9** calculates the cost savings if all the centers were closed and the current tonnage was transferred through the alternate sites shown. This analysis assumes the following rather conservative conditions for the incremental costs to transfer or handle the waste:

- Kawailoa would be $57, which is the full cost for FY 96/97 noted in Table 5-1. (Addition of 26 TPD to the 47 TPD average would be significant and would need to be studied in more detail to indicate whether such an increase in traffic and waste is sustainable.)

- Kapaa and Keehi would be $20 and $15/ton, respectively, to cover transfer and incremental operational costs.

- Handling of self-haul traffic of $10/ton at Waimanalo Gulch Landfill.

The theoretical savings would be approximately $1,400,000 per year or approximately 60% of the convenience center system costs. The actual savings will vary based on the actual disposal habits for the current users. The following additional considerations will affect the costs of the Refuse Division:

- Staff estimate that roughly 1/4 of the green waste that is delivered to the convenience centers would end up in curbside collection. This would result in the need to add an additional curbside green-waste collection route. This would be approximately $350,000 per year.

- A significant portion of the remaining green waste from the convenience centers would be delivered to Hawaiian Earth Products, Inc., rather than the Waimanalo Gulch Landfill (currently four of six convenience centers transfer to this facility because it is closer than transfer stations, and it may be logical to restrict or ban residential green waste at the Waimanalo Gulch Landfill). This would actually increase the cost savings noted above. The remainder of the green waste could be accepted at Kapaa.

- Staff estimate that roughly 1/4 of the bulky goods could end up in the curbside collection program. Although this could increase complaints, it may not require adding another crew.

In addition to loss of convenience for residents, a negative impact of closure of the centers will probably be an increase in illegal dumping by some residents used to the convenience centers. The City would need to undertake an education program before closure and may need to post guards at the facilities for some time to prevent illegal dumping at the facilities after they would be closed. Costs for increased illegal dumping that may persist would be borne by the City's road cleanup crews.

5.5 VEHICLE MAINTENANCE COSTS

5.5.1 Current Costs

The Automotive Equipment Services Division (AES) performs maintenance of the Refuse Division vehicles and rolling stock equipment. The maintenance costs for Fiscal Year 1996/97 are shown in **Table 5-10**. The costs were obtained from an AES last fiscal year cost summary report for tractor and trailer maintenance.

The information indicated a total maintenance cost for combined tractors and trailer was approximately $0.97 per mile for FY 1996/97. Approximately $0.41 per mile was used for fuel.

Table 5-10

AES Transfer Truck Vehicle Maintenance Cost Report FY 96/97

Description	Total Cost	No.	Miles	Average/ Unit	Avg. Per Mile
Transfer Trucks		32	--	--	--
Maintenance	$156,056	31	650,619	$5,034	$0.24
Oil and Miscellaneous	96	20	370,328	4.80	0.00
Fuel	269,821	30	650,619	8,994	0.41
Total	425,973	31	650,619	13,741	0.65
Transfer Trailer 47D		34			
Maintenance	202,827	34	650,619	5,966	0.31
Totals	$628,800			$19,707	0.97

Detailed data from AES for the transfer truck fleet from July 1, 1997, to February 11, 1998, were reviewed to assess costs for each transfer station site and whether maintenance costs for older trucks were exceeding costs for newer trucks by an abnormal amount. The data did not indicate a serious cost increase for older trucks. However, it did indicate maintenance costs for the transfer trailers at Keehi were far higher than the other sites, as shown in **Table 5-11.** The data from AES and an evaluation spreadsheet are included in Appendix D.

Table 5-11

Transfer Truck Fuel and Maintenance Costs (July 1, 1997 to February 11, 1998)

Fuel and Maintenance	Kapaa	Keehi	Kawailoa	
Prorated Miles to 2/98	201,416	145,131	32,980	379,528
Maintenance Cost to 2/11/98	$198,029	$204,642	$23,112	$425,783
Split	47%	48%	5%	100%
Cost Per Mile	$0.98	$1.41	$0.70	$1.12
Trailer Cost/Mile	$0.28	$0.69	$0.05	$0.41
Tractor Cost/Mile	$0.71	$0.72	$0.66	$0.71
Deduct Fuel Cost/Mile	$0.41	$0.41	$0.41	$0.41
Maintenance Only Cost/Mile	$0.57	$1.00	$0.29	$0.71
Split on maintenance Only	43%	54%	4%	$268,387

The 650,619 miles traveled by the transfer truck fleet in FY 96/97 was prorated for the seven-month period to February 11, 1998. The data indicate that the total cost per mile was approximately $1.12, including fuel. This is an increase of approximately 16 percent from FY1996/97. Assuming roughly $0.41 per mile for fuel, the average system cost is $0.71 per mile for only maintenance. The cost per mile over this period was greatly driven by much higher costs of $0.69 per mile for trailers alone that were assigned to Keehi.

5.5.2 Comparison to Other Systems

Table 5-12 compares the transfer truck maintenance costs from AES to other service providers.

It is difficult to compare transfer truck fleet maintenance costs between organizations because of the differences in the haul routes and the accounting for "Maintenance" costs. In general, fuel and oil costs for transfer vehicles on the mainland are approximately $0.25 per mile for trips in the range of the distance to the City sites. The higher fuel costs for Oahu are generally assumed to be due to higher fuel prices in Hawaii compared to the mainland and, to some degree, driving conditions. In general, the AES costs for maintenance may also be slightly higher because of higher parts costs.

Table 5-12

Comparison of Transfer Truck Maintenance Costs to Other Systems

Operator	Annual Tons	Round Trip Miles	Trucks in Fleet	Maintenance Costs Per Mile		Total
				Fuel	Maint.	
A – Private, CA	116,000	350	16	$0.20	$0.15	$0.35
B – Private, CA	143,000	51	6	$0.25	$0.45	$0.70
C – County, FL	283,000	63	12	$0.25	$0.45	$0.70
D – County, CA	120,000	50	5	$0.22	$1.00	$1.22
E – County, CA	115,200	68	8	$0.25	$0.17	$0.42
F – Private, CA	72,000	325	5	$0.30	$0.45	$0.75
Kapaa	72,940	72	10	$0.41	$0.57	$0.98
Keehi	136,853	46	12	$0.41	$1.00	$1.41
Kawailoa	17,127	56	4	$0.	$0.29	$0.70
Honolulu Total	206,920		26	$0.41	$0.71	$1.12

Maintenance costs vary considerably in the systems compared above in **Table 5-12**. The maintenance cost of $0.40 to $0.50 per mile for mainland U.S. operation may be a typical maintenance cost, based on data above and calculations using typical maintenance intervals. Some of the variance in data can be due to what overhead costs are charged to the maintenance function. For example, County E maintains a fleet of seven trucks plus one spare using one mechanic for most work (other than major work which is contracted to a local shop) in an administration and repair building at the transfer station. The mechanic is applied at an hourly rate which may not include all the capital costs and overhead for the shared building. It should also be noted that maintenance costs per mile drop for long, open routes as in Private entity A. However, longer trips over mountainous terrain, such as Private Entity F, increase maintenance costs to near maintenance costs for typical trips. County F believes that its costs are unusually high and is seeking to evaluate and change the system.

The table appears to indicate that maintenance costs for Kapaa are somewhat higher than usual and costs for Keehi are considerably higher than usual. The maintenance costs for Kawailoa appear effective over the period analyzed. The highest maintenance cost at Keehi is directly a result of trailer maintenance, as shown comparatively in **Table 5-12** above. This may be due to the fact that the compactor operation is stressing trailers. Conversion of the compactors to newer, more efficient preload compactors would likely reduce maintenance costs per mile. It would also increase payloads and reduce total miles, which could further decrease overall maintenance and operating costs.

5.6 OPTIMIZATION STRATEGIES FOR TRANSFER SERVICES

5.6.1 Transfer Station Optimization Strategies

Table 5-13 summarizes specific steps as a result of the operations reviews in previous sections. These steps are based on staffing levels and equipment operations observed at other facilities.

In addition to these more technical steps, general competitive business strategies and policy issues that may relate to both optimization of collection and transfer services are also discussed in the conclusions and recommendations of this report. Elements in **Table 5-13** that relate to the broader strategies recommended are indicated with an asterisk.

5.6.2 Convenience Center Optimization Strategies

As described in 5.4.4, some cost savings could be realized if the attendant could manage filling of bins at the centers to maximize payloads. The contractor transfer hauling cost is approximately half of the center costs for FY 96/97. If average payloads (currently at roughly 3 tons per load) were increased by 20 percent, approximately $230,000 would be saved annually based on the 33,500 tons handled in FY 96/97.

Table 5-13

Summary of Transfer Station Staffing and Equipment Optimization Strategies

Function	Optimization Element
Kapaa	· Increase target payload from 17 tons to maximize to 18.5 tons or greater. · *Work with AES to raise transfer truck availability from 43% to 75% or higher.
Keehi	· Evaluate facility for installation of new preload compactors to increase payloads, decrease trips, decrease trailer maintenance, and eliminate need for dedicated compactor operators. · Cross-training of drivers to run existing compactor system if existing compactors are retained. · *Evaluate reason for higher than typical overtime hours and provide incentives to reduce overtime.
Kawailoa	· Cross train operators/drivers to eliminate need for currently unfilled driver position. · Install self-weighing system to free up operator.
Vehicle Maintenance	· Configure maintenance hours during off-operations hours to maximize truck availability. · *Develop maintenance agreement with AES with performance requirements and incentives.

* Indicates general competitive strategy that may be used for both collection and transfer systems

The decision on whether to close the convenience centers is a function of balancing cost savings with a reduction in the high level of service currently provided. These issues were discussed previously in Section 5.4.4.

SECTION 6
CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations by HDR are summarized below. There is more detailed information regarding the basis for these conclusions in Sections 3 and 4 of this report.

6.1 COLLECTION SERVICES

Based on HDR's analysis, it is apparent that the performance of the City automated collection crews in Honolulu is at a high level when compared with published data from other U.S. jurisdictions. The costs of service is typical for automated refuse collection and appears to be comparable (within 10%) with recent bid prices and service costs offered by both public entities and private companies for automated refuse collection service. Analysis of costs also indicates that the City should continue to implement the planned conversion of manual routes to automated routes. This will include all but 20% of the residential routes that are not practical to be serviced by fully automated collection.

HDR's analysis indicates that costs could be reduced on the order of 10% to make the City's costs even more competitive, should the City be forced to compete in a managed competition process.

One optimization strategy would be to develop an internal MOU with its Equipment Maintenance Division to provide performance incentives to both equipment operators and maintenance personnel to minimize maintenance costs and leave "no routes standing." The MOU should also guarantee a minimum "Equipment Availability Factor" (e.g., a piece of equipment is guaranteed to be available for use 85% of the time). This strategy could also be applied to the transfer equipment in order to also reduce transfer system costs.

HDR's analysis indicates that the on-route performance of the City manual collection crews in Honolulu is at a high level. The costs of the equivalent once-per-week manual collection service in Honolulu, however, was found to be significantly higher than the average costs of refuse collection reported from national data even when differences in labor costs are accounted for.

The City has been considering servicing the manual collection routes (remaining 20% of the residences) through the use of semi-automated, rear loading, refuse collection trucks. HDR

concurs that the City should pursue this approach. A preliminary analysis of conversion from manual collection to three-person crews indicates that savings of 25% could be realized.

6.1.1 Transfer Services

Review of operations for the transfer stations resulted in findings and recommendations that vary for the specific operations at each facility. In general, maximizing the payload of transfer vehicles is an optimization strategy at any transfer station.

HDR recommends that the modifications to the two tamping crane positions at Kapaa is completed to allow better load leveling and payloads above the current 17 tons average. Transfer truck availability at Kapaa was 43% for the data period reviewed. This is very low compared to a typical industry target of 75% or better. HDR recommends that the Refuse Division works with AES to include an efficient target (80% or better) for transfer truck availability for all the Stations. As mentioned above, an internal MOU between the AES and Refuse Division to guarantee equipment availability is recommended.

A preliminary comparison of costs for the current compactor system at Keehi to a newer "preload" compactor design indicates this project could save costs. Based on general performance and costs from other projects, it appears that the increased payloads from such a system would exceed the costs. Preliminary discussions with compactor manufacturers indicate that suitable unit(s) could be fitted to the existing dimension for the load-out chutes (detailed analysis would have to be performed regarding the construction costs). This system would save even more if the loader operators at Keehi would run the pre-load compactors with a remote control and drivers could close the door after the compactor is cycled. This would alleviate the need for the two dedicated compactor operator positions.

The maintenance costs for transfer trailers at Keehi was very high compared to the City's other two stations as well as costs at other public and private transfer stations. A possible reason may be that the compactors are stressing the trailers. In addition to increasing payloads, installation of pre-load compactors should reduce the trailer maintenance over current levels because compaction stresses would be primarily borne by the compactor unit rather than the trailers. It is recommended that this issue be discussed in more detail by AES and the Refuse Division to see if there are other factors regarding the equipment or maintenance procedures which are causing these costs to be high.

Higher than average overtime hours were found at the Keehi transfer station. It is not clear if this is due to the target of four loads per day being tight within the working day due to traffic, or because of unusual time off noted by City staff for injury or illness for the data period reviewed. A certain amount of overtime is healthy; however, incentives to reduce overtime could be considered.

Review of operations at Kawailoa indicated low transfer truck maintenance costs. It was also noted that optimal staffing could be achieved if drivers and operators were cross-trained. This would eliminate the need for the currently authorized third driver position by sharing the available production of both the second driver and second operator. This would require having weigh/data equipment used to enable automatic weighing of loads to eliminate the need for remote operation of the scale by the supervisor who could perform other duties.

Review of the convenience center system by HDR indicates that the sites are effectively designed and staffed for the intended purpose. Costs for the existing system could be saved if the payloads transferred by the contractor were increased.

APPENDIX A

TRANSFER STATION AND CONVENIENCE CENTERS

COST, TONNAGE, STAFFING, AND OVERTIME INFORMATION

By FAX
To 916-351-3888

To: **Mark Urquhart**

From: Wilma Namumnart

Attached is the actual direct costs for operating the convenience centers. Salary and fringe costs attributed to the convenience centers was for 20% of the salaries of the disposal engineer, the disposal facilities superintendent for FY94/95.

For FY96/97, in addition to the above salaries, the salaries of three convenience center attendants were added. The salaries included maintenance personnel which caused a greater increase. For previous years, maintenance personnel salaries was charged only to incineration. When the incinerator closed, maintenance salaries were proportioned to transfer station and convenience center activities.

F89/90	Hauling	Guard	Yard	Total:
Waimanalo	59435	54802	3600	117,837
Ewa	79853	47948	3600	131,401
Waipahu	182476	86043	3600	272,119
Laie	236731	52988	3600	293,319
Waianae	86072	83639	3600	173,311
Wahiawa				0

F90/91	Hauling	Guard	Yard	Total:
Waimanalo	100000	52959	3600	156,559
Ewa	74067	57596	3600	135,263
Waipahu	187288	106123	3600	297,011
Laie	294083	58307	3600	355,990
Waianae	105759	106093	3600	215,452
Wahiawa				0

F91/92	Hauling	Guard	Yard	Total:
Waimanalo	106806	55222	3900	165,928
Ewa	75298	59096	3900	138,294
Waipahu	269832	109272	3900	383,004
Laie	302116	60163	3900	366,179
Waianae	95220	109272	3900	208,392
Wahiawa				0

F92/93	Hauling	Guard	Yard	Total:
Waimanalo	138153	56631	8700	203,484
Ewa	72560	63459	8700	144,719
Waipahu	260496	117203	5700	383,399
Laie	266614	64500	6900	338,014
Waianae	120546	117230	8700	246,476
Wahiawa	119273	90104	6600	215,977

F93/94	Hauling	Guard	Yard	Total:
Waimanalo	147413	56457	10200	214,070
Ewa	97508	63241	8300	169,049
Waipahu	319291	117471	6900	443,662
Laie	237856	64636	6900	309,392
Waianae	147282	117471	8300	273,053
Wahiawa	160642	100652	6900	268,194

F94/95	Hauling	Guard	Yard	Total:
Waimanalo	149311	56734	13500	219,545
Ewa	120238	64115	10800	195,153
Waipahu	392459	118359	8100	518,918
Laie	194598	65326	8100	268,024
Waianae	153621	118416	10800	282,837
Wahiawa	244948	101617	8100	354,665

F95/96	Hauling	Guard	Yard	Total:
Waimanalo	151843	78686	8961	239,490
Ewa	215262	78686	8961	302,909
Waipahu	209692	145267	7416	362,375
Laie	307434	78686	7107	393,227
Waianae	132010	145267	10815	288,092
Wahiawa	179010	145267	7416	331,693
Total:				

F96/97	Hauling	Guard	Yard	Total:
Waimanalo	229264	57872	5200	292,336
Ewa	137360	53482	2000	192,842
Waipahu	275442	98287	2100	375,829
Laie	217891	53388	4800	276,079
Waianae	141049	98287	5000	244,336
Wahiawa	191792	102661	4800	299,253
Total:				

12057151

KCC-DAT

Mark -
Tons/trip info should be gotten from Wayne -
(808) 523-4775.

Wilma

Post-it® Fax Note 7671	Date 6/19/98	# of pages ▶ 2
To Mark Urquhart	From Wilma	
Co./Dept. HDR	Co.	
Phone #	Phone # (808) 537-5378	
Fax # (916) 351-3888	Fax #	

OPERATIONAL DATA
July 1, 1996 to June 30, 1997

Collection: . . . . . 302,078 Tons

Disposal:

	Tons of Refuse Delivered	
	Refuse Div	Others
H-POWER	244,644	344,296
Kapaa Landfill	1,574	23,224
Waimanalo Gulch Landfill, municipal solid waste (MSW)	87,167	275,483

H-POWER

Residue	76,107
Unacceptable MSW	12,784
Ash (wet weight)	92,186

Transfer:

	Tons Transferred	
	Refuse Div	Others
Convenience Centers	—	33,553
Kapaa Transfer Station	59,951	12,989
Kawailoa Transfer Station	15,773	1,354
Keehi Transfer Station	127,493	9,360

add Refuse Div + Others for Station total.

DEPARTMENT OF PUBLIC WORKS EXHIBIT

DIVISION OF REFUSE COLLECTION AND DISPOSAL

Refuse TRANSFER STATION Operating Costs
Actual for the Fiscal Year 1996-97

TRANSFER STATION EXPENSES:	
Direct Salaries and Wages	2,445,160
Labor Fringe Costs - Salaries and Wages	1,118,528
Indirect Costs - Refuse Division	486,504
Current Expenses	790,638
	4,840,831
Vehicle/Equipment Maintenance:	
Labor Costs	288,418
Labor Fringe Costs - Salaries and Wages	108,417
Indirect Costs - AES Division	212,363
Other Operating and Maintenance Costs	633,390
	1,242,587
Capital Cost Recovery	
Equipment	532,516
Facilities	1,591,798
	2,124,314
TOTAL REFUSE TRANSFER STATION	8,207,732
Tons Transfer	226,920
Cost per Ton	$36.17

DEPARTMENT OF PUBLIC WORKS EXHIBIT 1

DIVISION OF REFUSE COLLECTION AND DISPOSAL

Refuse COLLECTION Operating Costs
Actual for the Fiscal Year 1996-97

COLLECTION EXPENSES:	
Direct Salaries and Wages	10,775,857
Labor Fringe Costs - Salaries and Wages	4,050,645
Indirect Costs - Refuse Division	2,144,032
Current Expenses	293,551
	17,264,085
Road Maintenance Division - Support on Collection Activities:	
Salaries and Wages	182,462
Labor Fringe Costs - Salaries and Wages	68,587
Indirect Costs - Road Division	63,387
	314,436
Vehicle/Equipment Maintenance:	
Labor Costs	785,477
Labor Fringe Costs - Salaries and Wages	295,261
Indirect Costs - AES Division	578,347
Other Operating and Maintenance Costs	1,624,836
	3,283,921
Capital Cost Recovery	
Equipment	3,074,796
TOTAL REFUSE COLLECTION	23,937,238
Tons Collection (Including Business)	302,078
Cost per Ton	$79.24
INSPECTION AND INVESTIGATION:	
Salaries and Wages	62,155
Labor Fringe Costs - Salaries and Wages	23,364
Indirect Costs - Refuse Division	12,369
Current Expense	6,482
Capital Recovery - Equipment	804
TOTAL INSPECTION AND INVESTIGATION	105,174
Tons Collection (Business)	11,855
Cost per Ton	$8.87
COMBINED COLLECTION AND INSPECTION - INVESTIGATION COSTS:	
Collection Cost per Ton	$79.24
Inspection - Investigation Cost per Ton	$8.87
TOTAL BUSINESS COLLECTION COST PER TON	$88.11

DEPARTMENT OF PUBLIC WORKS **EXHIBIT**

DIVISION OF REFUSE COLLECTION AND DISPOSAL

Refuse CONVENIENCE CENTER Operating Costs
Actual for the Fiscal Year 1996-97

CONVENIENCE CENTER EXPENSES:	
Direct Salaries and Wages	258,004
Labor Fringe Costs - Salaries and Wages	182,438
Indirect Costs - Refuse Division	51,334
Current Expenses	1,702,398
	2,194,174
Capital Cost Recovery	
Facilities	172,246
	172,246
TOTAL REFUSE CONVENIENCE CENTER	2,366,420
Tons Transfer	33,553
Cost per Ton	$70.53

FY 96-97

REFUSE DIVISION CAPITAL RECOVERY - FACILITIES

	CAPITAL COST	YEAR	LIFE	INTEREST	RECOVERY
I. REFUSE DIVISION CAPITAL IMPROVEMENTS					
Incineration					
Waipahu Incinerator	5,503,989	70	25	7.00%	472,300
Waipahu Incinerator-Mod	4,110,551	77	25	7.00%	352,729
Waipahu Incin-Reline furnaces	4,317,917	90	15	7.00%	474,084
Waipahu Incin-Precipitator	2,800,000	90	15	7.00%	307,425
Waipahu Incin-Precipitator	1,293,086	91	15	7.00%	141,974
Waipahu Incin-Stack	529,922	87	20	7.00%	50,021
Waipahu Incin-Ash Envirn Assmt	16,500	80	25	7.00%	1,416
Waipahu Incin-Pollution Study	192,011	91	5	7.00%	46,830
	18,763,977				1,846,778
Landfill-City Operated					
Kapaa - Caretaker quarters	29,895	76	25	7.00%	2,565
Kapaa - Closure	915,236	90	25	7.00%	78,537
Kapaa - Site No. 1	65,908	89	25	7.00%	5,656
Kalaheo - Closure	6,287,334	90	30	7.00%	506,674
Waianae Landfill Closure	904,344	90	30	7.00%	72,878
	8,202,717				666,309
Landfill-Contractor Operated					
Waimanalo Gulch/Phase II	8,755,613	88	20	7.00%	826,468
Liner & Excavation-FY96-FY97	938,652	96	20	7.00%	88,602
	9,694,265				915,070
Transfer Station					
Keehi Transfer Station	2,540,000	77	25	7.00%	217,959
Keehi Trf Stn - Compactor	30,000	78	15	7.00%	3,294
Keehi Trf Stn - Mod	2,863,860	89	10	7.00%	407,749
Keehi Trf Stn - Truck Wash Fac	650,000	92	15	7.00%	71,367
Kawailoa Transfer Station	623,338	86	25	7.00%	53,489
Kawailoa T/S - Computer/Scale	327,577	91	25	7.00%	28,110
Kapaa Transfer Station	9,437,429	90	25	7.00%	809,831
	16,472,204				1,591,798
Convenience Centers					
Ewa	230,000	87	25	7.00%	19,736
Laie	664,076	88	25	7.00%	56,985
Waianae	196,000	85	25	7.00%	16,819
Waipahu	181,000	87	25	7.00%	15,532
Wahiawa	515,772	91	25	7.00%	44,259
Waimanalo	220,435	93	25	7.00%	18,916
	2,007,283				172,246
Refuse Division Total	55,140,446				5,192,201

COVER SHEET

FAX

To: Mr. Mark Urquhart
Fax #: (916) 351-3888
Subject: Manage Competition
Date: March 6, 1998
Pages: , including this cover sheet.

COMMENTS:

The following are my responses to your questionnaire dated March 2, 1998:

1. Staffing for typical days and shifts (see attached work schedules for Kapaa, Keehi and Kawailoa Transfer Stations):

a. Kapaa:
   1) Operators
      1- knuckleboom crane
      1- wheel loader
      1- maintenance tasks: sweeping, landfill maintenance, etc.
      1- leachate pumping
      1- transfer truck driving (on heavy days)
   2) Truck drivers
      5-6 drivers haul 4 loads per day.

b. Keehi:
   1) Operators
      1 - early shift; wheel loader
      1 - wheel loader
      2 - compactors
      1 - late shift (to cover afternoons)
   2) Truck drivers
      8 drivers haul 4 loads per day.

c. Kawailoa:
   1) Operators
      1 - lead, overall, scale duties
      1 - knuckleboom crane
      1 - misc. cleaning, truck driving, etc.

From the desk of...
Wayne Y. Hamada
Disposal Operations Engineer
Division of Refuse Collection and Disposal
650 South King Street
Honolulu, Hawaii 96813

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2) Truck drivers
2 drivers hauling 3 loads per day.

2. Longhaul productivity:
Actual in-service factor: Kapaa - 43%
Keehi - 75
Kawailoa - 80

The break policy or practice is for the drivers to have the flexibility to take their lunch break on the road or to take the approximate 1 hour at the end of their day.

3. Actual productive hours per employee/yr.(10 hr. shift):
10 hrs./day x 4 days/wk x 52 wks/yr = 2080 hrs.
2080 hrs. - (21 days sick x 8 hrs./day) - (21 days vacation x 8 hrs./day)
= 1744 hrs.

4. Transfer Station Costs- Wilma can provide.

KAPAA TRANSFER STATION
PRESENT SCHEDULE

OPERATORS	SUN	MON	TUE	WED	THU	FRI	SAT	
R. Fernandez	O	X	X	O	X	X	O	
L. Taylor	O	X	X	O	X	X	O	
Rodney Pua	X	X	X	X	O	O	O	
A. Adler	O	O	O	X	X	X	X	7
A. Govai	O	O	O	X	X	X	X	
J. Kawthi	O	O	O	X	X	X	X	
R. DeCosta	X	X	X	X	O	O	O	
1	1	4	4	5	5	5	3	
DRIVERS								
N. Perez	O	X	X	O	X	X	O	
C. Wong	O	X	X	O	X	X	O	
K. Ramos	O	O	O	X	X	X	X	
R. Mumford	O	O	O	X	X	X	X	
B. Nuuttiwa	X	X	X	X	O	O	O	9
G. Keohokapu	O	O	O	X	X	X	X	
J. Kam	O	O	O	X	X	X	X	
W. Lindsey	X	X	X	X	O	O	O	
M. Lum	X	X	X	O	O	O	X	
9	3	5	5	6	6	6	5	
1 VACANT								
RAMP ATTD								
E. Santos	X	X	X	X	O	O	O	1
SCALE ATTD								
T. Hivo	O	O	X	X	X	X	O	2
M. Bernabe	X	X	X	O	O	O	X	

X — WORK

O — DAY OFF

SCHEDULE SHEET

Kawailoa Transfer Station
Normal 7 Day Operation (7 a.m. - 6 p.m.)

SUPERVISOR	SUN	MON	TUES	WED	THU	FRI	SAT
R. NAHINU	OFF						
LEAD OPERATOR	7:00-3:30						
D. SILVA	OFF	-	-	-	-	-	OFF
OPERATORS	7:00-3:30						
A. POOPAA	OFF	-	-	-	OFF	-	-
R. LORENZO	-	-	-	OFF	-	OFF	-
DRIVERS	7:00-3:30						
J. BOLOSAN	OFF	-	-	-	OFF	-	-
D. RODRIGUES	OFF	-	-	-	-	OFF	-
Vacant	-	-	-	OFF	-	-	OFF

COVER SHEET

FAX

To: Mr. Mark Urquhart
Fax #: (916)351-3888
Subject: Managed Competition
Date: March 9, 1998
Pages: 5, including this cover sheet.

COMMENTS:

Keehi Work Schedule and Overtime Summaries as requested (Overtime Summaries available from July through November 1997).

From the desk of...
Wayne Y. Hamada
Disposal Operations Engineer
Division of Refuse Collection and Disposal
650 South King Street
Honolulu, Hawaii 96813

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Keeji Refuse Transfer Station Schedule Change Proposal

SCHEDULE SHEET

TALK TO TROOPS - 02-04-98/02-06-98

Kawailoa - Sunday Normal Off

Sunday Driver Work (Rotation)

PRESENT SCHEDULE 4/5 Splits 8 Hrs

= 3 = SUPERVISORS	SUN	MON	TUES	WED	THU	FRI	SAT
1030-1900	OFF	W	W	W	W	W	O
0400-1230	OFF	O	W	W	W	W	W
0615-1445	OFF	W	W	W	O	W	W
		2	3	3	2	3	2
= 6 = OPERATORS	8 HRS						
0400-1230 LOR	OFF	O	W	W	W	W	W
0615-1445 LOR	OFF	W	W	W	W	W	O
" " COMP	OFF	W	W	O	W	W	W
" " COMP	OFF	W	W	W	W	O	W
1030-1900 LATE	OFF	W	W	W	O	W	W
RELV	OFF	W	O	W	W	W	W
		5	5	5	5	5	5
= 10 = DRIVERS	8 HRS						
	OFF	W	W	W	W	W	O
	OFF	W	W	W	W	W	O
	OFF	O	W	W	W	W	W
	OFF	O	W	W	W	W	W
	OFF	W	W	O	W	W	W
	OFF	W	W	O	W	W	W
	OFF	W	W	W	O	W	W
	OFF	W	W	W	O	W	W
	OFF	W	W	W	W	O	W
	OFF	W	W	W	W	O	W
		8	10	8	8	8	8
= 3 = SCALE ATTENDANT	8 1/2 S						
1030 - 1900	OFF	O	W	W	W	W	W
0400 - 1230	OFF	W	W	W	W	W	O
REL.	OFF	W	W	W	O	W	W
		2	3	3	2	3	2
= 2 = LABOR II RAMP	8 HRS						
0615-1245	OFF	W	W	W	W	W	O
VACANT		O	W	W	W	W	W
		1	1	1	1	1	0

nov. 1997

DEPARTMENT OF PUBLIC WORKS
DIVISION OF REFUSE COLLECTION AND DISPOSAL
KEEHI REFUSE TRANSFER STATION (2053)

*SOURCE: DISTRIBUTION OF PAYROLL

COMPARATIVE REPORT ON OVERTIME HOURS

MONTH	FY	HOLIDAY ALLOTMENT	HOLIDAY ACTUAL* (REF.ONLY)	HOLIDAY SURPLUS OR (DEFICIT)	NON-HOLIDAY ALLOTMENT	NON-HOLIDAY ACTUAL* (REF.ONLY)	NON-HOLIDAY SURPLUS OR (DEFICIT)	AID FROM ROAD	MONTHLY TOTAL ALLOTMENT	MONTHLY TOTAL ACTUAL*	MONTHLY TOTAL (DEFICIT)	CUMULATIVE TOTAL ALLOTMENT	CUMULATIVE TOTAL ACTUAL*	CUMULATIVE TOTAL SURPLUS OR (DEFICIT)
JULY	FY '98	240	280	(40)	800	1,314	(514)		1,040	1,594	(554)	1,040	1,594	(554)
	FY '97	140	306		700	673			840	979		840	979	
AUGUST	FY '98	0	0	0	800	1,139	(339)		800	1,139	(339)	1,840	2,733	(893)
	FY '97	0	0		600	810			600	810		1,440	1,789	
SEPTEMBER	FY '98	360	192	168	1,000	737	263		1,360	929	431	3,200	3,662	(462)
	FY '97	260	298		550	793			810	1,091		2,250	2,879	
OCTOBER	FY '98	0	0	0	800	1,049	(249)		800	1,049	(249)	4,000	4,711	(711)
	FY '97	0	0		480	1,005			480	1,005		2,730	3,884	
NOVEMBER	FY '98	360	0	360	800	1,495	(695)		1,160	1,495	(335)	5,160	6,206	(1,046)
	FY '97	260	144		520	776			780	920		3,510	4,805	
DECEMBER	FY '98	240			1,000				1,240	0		6,400		
	FY '97	140	308		820	1,164			960	1,472		4,470	6,276	
JANUARY	FY '98	0			900				900	0		7,300		
	FY '97	0	0		740	1,455			740	1,455		5,210	7,731	
FEBRUARY	FY '98	240			900				1,140	0		8,440		
	FY '97	140	96		740	1,244			880	1,340		6,090	9,071	
MARCH	FY '98	240			1,000				1,240	0		9,680		
	FY '97	140	138		860	1,012			1,000	1,150		7,090	10,221	
APRIL	FY '98	280			710				990	0		10,670		
	FY '97	280	274		480	1,097			760	1,371		7,850	11,592	
MAY	FY '98	0			700				700	0		11,370		
	FY '97	0	0		480	746			480	746		8,330	12,337	
JUNE	FY '98	240			800				1,040	0		12,410		
	FY '97	140	152		740	1,089			880	1,241		9,210	13,578	
TOTAL	FY '98	2,200	472	488	10,210	5,734	(1,534)	0	12,410	6,206	(1,046)			
	FY '97	1,500	1,716		7,710	11,862		0	9,210	13,578				

nov. 1997

DEPARTMENT OF PUBLIC WORKS
DIVISION OF REFUSE COLLECTION AND DISPOSAL
KAWAILOA REFUSE TRANSFER STATION (2053-04)

*SOURCE: DISTRIBUTION OF PAYROLL

COMPARATIVE REPORT ON OVERTIME HOURS

MONTH	FY	HOLIDAY ALLOTMENT	HOLIDAY ACTUAL* (REF.ONLY)	HOLIDAY SURPLUS OR (DEFICIT)	NON-HOLIDAY ALLOTMENT	NON-HOLIDAY ACTUAL* (REF.ONLY)	NON-HOLIDAY SURPLUS OR (DEFICIT)	AID FROM ROAD	MONTHLY TOTAL ALLOTMENT	MONTHLY TOTAL ACTUAL*	MONTHLY TOTAL (DEFICIT)	CUMULATIVE TOTAL ALLOTMENT	CUMULATIVE TOTAL ACTUAL*	CUMULATIVE TOTAL SURPLUS OR (DEFICIT)
JULY	FY '98	30	72	(42)	60	311	(251)		90	383	(293)	90	383	(293)
	FY '97	30	72		60	399			90	471		90	471	
AUGUST	FY '98	0	0	0	60	274	(214)		60	274	(214)	150	657	(507)
	FY '97	30	0		60	298			90	298		180	769	
SEPTEMBER	FY '98	60	192	(132)	60	678	(618)		120	870	(750)	270	1,527	(1,257)
	FY '97	30	72		60	326			90	398		270	1,167	
OCTOBER	FY '98	0	0	0	60	483	(423)		60	483	(423)	330	2,009	(1,679)
	FY '97	0	0		60	411			60	411		330	1,578	
NOVEMBER	FY '98	30	0	30	90	370	(280)		120	370	(250)	450	2,379	(1,929)
	FY '97	30	32		90	302			120	334		450	1,912	
DECEMBER	FY '98	30			140				170	0		620		
	FY '97	30	56		140	278			170	334		620	2,246	
JANUARY	FY '98	30			130				160	0		780		
	FY '97	30	0		130	307			160	307		780	2,553	
FEBRUARY	FY '98	30			140				170	0		950		
	FY '97	30	32		140	245			170	277		950	2,830	
MARCH	FY '98	30			130				160	0		1,110		
	FY '97	30	24		130	232			160	256		1,110	3,086	
APRIL	FY '98	40			60				100	0		1,210		
	FY '97	40	64		60	357			100	421		1,210	3,506	
MAY	FY '98	0			100				100	0		1,310		
	FY '97	0	0		100	220			100	220		1,310	3,726	
JUNE	FY '98	20			50				70	0		1,380		
	FY '97	20	32		50	219			70	251		1,380	3,976	
TOTAL	FY '98	300	264	(144)	1,080	2,115	(1,785)	0	1,380	2,379	(1,929)			
	FY '97	300	384		1,080	3,592		0	1,380	3,976				

nov/1997

DEPARTMENT OF PUBLIC WORKS
DIVISION OF REFUSE COLLECTION AND DISPOSAL
KAPAA REFUSE TRANSFER STATION (2053-06)

*SOURCE: DISTRIBUTION OF PAYROLL

COMPARATIVE REPORT ON OVERTIME HOURS

MONTH	FY	HOLIDAY ALLOTMENT	HOLIDAY ACTUAL* (REF.ONLY)	HOLIDAY SURPLUS OR (DEFICIT)	NON-HOLIDAY ALLOTMENT	NON-HOLIDAY ACTUAL* (REF.ONLY)	NON-HOLIDAY SURPLUS OR (DEFICIT)	AID FROM ROAD	MONTHLY TOTAL ALLOTMENT	MONTHLY TOTAL ACTUAL*	MONTHLY TOTAL (DEFICIT)	CUMULATIVE TOTAL ALLOTMENT	CUMULATIVE TOTAL ACTUAL*	CUMULATIVE TOTAL SURPLUS OR (DEFICIT)
JULY	FY '98	140	309	(169)	700	1,167	(467)		840	1,476	(636)	840	1,476	(636)
	FY '97	140	326		700	667			840	993		840	993	
AUGUST	FY '98	0	0	0	600	1,043	(443)		600	1,043	(443)	1,440	2,519	(1,079)
	FY '97	0	0		600	399			600	399		1,440	1,392	
SEPTEMBER	FY '98	260	326	(66)	550	1,076	(526)		810	1,402	(592)	2,250	3,921	(1,671)
	FY '97	260	348		550	552			810	900		2,250	2,292	
OCTOBER	FY '98	0	0	0	480	1,368	(888)		480	1,368	(888)	2,730	5,289	(2,559)
	FY '97	0	0		480	801			480	801		2,730	3,093	
NOVEMBER	FY '98	260	0	260	520	767	(247)		780	767	13	3,510	6,056	(2,546)
	FY '97	260	188		520	866			780	1,054		3,510	4,147	
DECEMBER	FY '98	140			820				960	0		4,470		
	FY '97	140	338		820	767			960	1,105		4,470	5,252	
JANUARY	FY '98	0			740				740	0		5,210		
	FY '97	0	130		740	1,237			740	1,367		5,210	6,619	
FEBRUARY	FY '98	140			740				880	0		6,090		
	FY '97	140	208		740	975			880	1,183		6,090	7,802	
MARCH	FY '98	140			860				1,000	0		7,090		
	FY '97	140	188		860	897			1,000	1,085		7,090	8,887	
APRIL	FY '98	280			480				760	0		7,850		
	FY '97	280	986		480	1,235			760	1,621		7,850	10,508	
MAY	FY '98	0			480				480	0		8,330		
	FY '97	0	0		480	871			480	871		8,330	11,379	
JUNE	FY '98	140			740				880	0		9,210		
	FY '97	140	178		740	858			880	1,036		9,210	12,415	
TOTAL	FY '98	1,500	635	25	7,710	5,421	(2,571)	0	9,210	6,056	(2,546)			
	FY '97	1,500	2,290		7,710	10,125		0	9,210	12,415				

COMPARISON OF OVERTIME AT TRANSFER STATION FACILITIES FY 1996/1997
Source: Comparative Report on overtime hours, Nov. 1997

	Kapaa	Keehi	Kawailoa
Actual Holiday (hrs)	2,290	1,716	384
Actual Non-Holiday (hrs)	10,125	11,862	3,592
Total (hrs)	12,415	13,578	3,976
Total (Filled) Staff	*23*	*21*	*5*
Holiday Hours/yr./staff	100	82	77
Non-Holiday Hours/yr/staff	440	565	718
Total OT hours per /yr/staff	540	647	795
Shift hours/day	*10*	*8*	*8*
Holiday-days/yr/staff	10.0	10.2	9.6
Non-Holiday OT days/yr/staff	44	71	90
Total OT days per /yr/staff	54	81	99
Holiday (days)	229	215	48
Non-Holiday OT (days)	1,013	1,483	449
Total OT days per year	1,242	1,697	497
Productive days/year (-42 sick&vac.)	166.00	218.00	218.00
OT - Non-holiday (Productive Man-year	6.10	6.80	2.06
Minus Unfilled staff positions	7.00	2.00	1.00
Balance Non-holiday OT (Man-years)	(0.90)	4.80	1.06
Cost of Benefit factor			

APPENDIX B

TRANSFER STATION ROUTE TIME,

STAFFING, AND EQUIPMENT LEVELS

TRANSFER STATION STAFFING AND EQUIPMENT LEVELS

Kapaa Transfer Station		TPD ave	270	
		TPD peak	450	
		Oper. Hrs/day	9.5	
		Two pits with knucklebooms		
Longhaul				
Hvy Truck Driver	13	6	7.0	<required drivers PEAK
Tons per load		**17**	**17.5**	
Trips per day	4	24	26.00	required for typ peak day
TPD transferred		408	450	
Hvy Truck Driver	13	5	4.0	<required drivers AVE
Tons per load		17	**17.5**	
Trips per day	4	20	16.00	
TPD transferred		340	270	
Hvy Truck Driver	13		6.0	<required drivers PEAK
Tons per load			**18.8**	
Trips per day	4		24.00	
TPD transferred			450	
Tractors	14	12	10	Rigs Required per AVE @ avail.
Avail. factor assumed	**43%**	14	17	Rigs Required per PEAK @ avail.
Trailers	*12*			

KAPAA LONGHAUL PRODUCTIVITY

Assumptions with no highway delays	Minutes	Miles	Ave. MPH
TS Waste Loading	15		
Travel to Disposal Site	45	36	**48**
Unloading at Disposal (includes queue)	25		
Return to TS	45	36	48

Trip #	Activity	Minutes	Cumulative Min.	Cumulative Hours
1	Prep. and Vehicle Inspection	20	20	0.33
1	TS Waste Loading	15	35	0.58
1	Travel to Disposal Site	45	80	1.33
1	Unloading at Disposal (includes queue)	25	105	1.75
1	Return to TS	45	150	2.50
2	TS Waste Loading	15	165	2.75
2	Travel to Disposal Site	45	210	3.50
2	Unloading at Disposal (includes queue)	25	235	3.92
2	Return to TS	45	280	4.67
3	TS Waste Loading	15	295	4.92
3	Travel to Disposal Site	45	340	5.67
3	Unloading at Disposal (includes queue)	25	365	6.08
3	Return to TS	45	410	6.83
4	TS Waste Loading	15	425	7.08
4	Travel to Disposal Site	45	470	7.83
4	Unloading at Disposal (includes queue)	25	495	8.25
4	Return to TS	45	540	9.00
	Lunch (1 hr) f/11 hrs (or skip for 10 hr)	60	600	10.00
	Total of 2 breaks each day	30	630	10.50
	Additional traffic contingency/day	**30**	660	11.00
	Total Minutes	660		

	TRANSFER STATION STAFFING AND EQUIPMENT LEVELS				
	Kehii Transfer Station		TPD ave	440	
	8 hour transfer day		TPD peak	600	
			Oper. Hrs/day	14	
			Four compactors		
	Longhaul				
	Hvy Truck Driver	10	8	8.0	<drivers @ tons shown PEAK
	Tons per load		**17**	**18.8**	
	Trips per day	4	32	32.00	
	TPD transferred	below peak>	***544***	**600**	
	Hvy Truck Driver	10	7	6.0	<required drivers AVE
	Tons per load		15.71	**18.8**	<required AVE
	Trips per day	4	28	24.00	
	TPD transferred		440	440	
	Hvy Truck Driver	10		9.0	<required drivers PEAK
	Tons per load			**16.70**	
	Trips per day	4		36.00	
	TPD transferred			600	
	Tractors	17			
	Avail. factor assumed	80%	10	10	Rigs Required per drivers @ avail
	Trailers	20			
	KEHII LONGHAUL PRODUCTIVITY				
	Assumptions with no highway delays	Minutes	Miles	MPH	
	TS Waste Loading	15			
	Travel to Disposal Site	35	23	39.43	
	Unloading at Disposal (includes queue)	25			
	Return to TS	35	23	39.43	
Trip #	Activity	Minutes	umulative Min.	Cumulative Hours	
1	Prep. and Vehicle Inspection	20	20	0.33	
1	TS Waste Loading	15	35	0.58	
1	Travel to Disposal Site	35	70	1.17	
1	Unloading at Disposal (includes queue)	25	95	1.58	
1	Return to TS	35	130	2.17	
2	TS Waste Loading	15	145	2.42	
2	Travel to Disposal Site	35	180	3.00	
2	Unloading at Disposal (includes queue)	25	205	3.42	
2	Return to TS	35	240	4.00	
3	TS Waste Loading	15	255	4.25	
3	Travel to Disposal Site	35	290	4.83	
3	Unloading at Disposal (includes queue)	25	315	5.25	
3	Return to TS	35	350	5.83	
4	TS Waste Loading	15	365	6.08	
4	Travel to Disposal Site	35	400	6.67	
4	Unloading at Disposal (includes queue)	25	425	7.08	
4	Return to TS	35	460	7.67	
	Lunch (1 hr) f/9 hrs (or skip for 8 hr)	60	520	8.67	
	Total of 2 breaks each day	30	550	9.17	
	Additional traffic contingency/day	**-10**	540	9.00	
	Total Minutes	540			

	TRANSFER STATION STAFFING AND EQUIPMENT LEVELS						
	Kehii Transfer Station		TPD ave	440			
	8 hour transfer day		TPD peak	600			
			Oper. Hrs/day	14			
			Four compactors				
	Longhaul						
	Hvy Truck Driver	10	8	11.0	<drivers @ tons shown PEAK		
	Tons per load		**17**	**18.2**			
	Trips per day	3	24	33.00			
	TPD transferred	below peak>	***408***	**600**			
	Hvy Truck Driver	10	7	8.0	<required drivers AVE		
	Tons per load		20.95	**18.8**	<required AVE		
	Trips per day	3	21	24.00			
	TPD transferred		440	440			
	Hvy Truck Driver	10		7.0	<required drivers AVE@ tons		
	Tons per load			**21.50**			
	Trips per day	3		21.00			
	TPD transferred			440			
	Tractors	17					
	Avail. factor assumed	80%	10	14	Rigs Required per drivers @ avail		
	Trailers	20					
	KEHII LONGHAUL PRODUCTIVITY						
	Assumptions with no highway delays	Minutes	Miles	MPH			
	TS Waste Loading	15					
	Travel to Disposal Site	35	23	39.43			
	Unloading at Disposal (includes queue)	25					
	Return to TS	35	23	39.43			
Trip #	Activity	Minutes	umulative Min.	Cumulative Hours			
1	Prep. and Vehicle Inspection	20	20	0.33			
1	TS Waste Loading	15	35	0.58			
1	Travel to Disposal Site	35	70	1.17			
1	Unloading at Disposal (includes queue)	25	95	1.58			
1	Return to TS	35	130	2.17			
2	TS Waste Loading	15	145	2.42			
2	Travel to Disposal Site	35	180	3.00			
2	Unloading at Disposal (includes queue)	25	205	3.42			
2	Return to TS	35	240	4.00			
3	TS Waste Loading	15	255	4.25			
3	Travel to Disposal Site	35	290	4.83			
3	Unloading at Disposal (includes queue)	25	315	5.25			
3	Return to TS	35	350	5.83			
4	TS Waste Loading	15	365	6.08			
4	Travel to Disposal Site	35	400	6.67			
4	Unloading at Disposal (includes queue)	25	425	7.08			
4	Return to TS	35	460	7.67	Three Trips		
	Lunch (1 hr) f/9 hrs (or skip for 8 hr)	60	520	8.67	60	410	6.83
	Total of 2 breaks each day	30	550	9.17	30	440	7.33
	Additional traffic contingency/day	**-10**	540	9.00	**100**	540	9.00
	Total Minutes	540			540		

TRANSFER STATION STAFFING AND EQUIPMENT LEVELS

Kehii Transfer Station		TPD ave	440	
10 hour transfer day		TPD peak	600	
		Oper. Hrs/day	14	
		Four compactors		
Longhaul				
Hvy Truck Driver	10	8	8.0	<drivers @ tons shown PEAK
Tons per load		**17**	**18.8**	
Trips per day	4	32	32.00	
TPD transferred	below peak>	***544***	**600**	
Hvy Truck Driver	10	7	7.0	<required drivers AVE
Tons per load		15.71	**16.4**	<required AVE
Trips per day	4	28	27.00	
TPD transferred		440	440	
Hvy Truck Driver	10		9.0	<required drivers PEAK
Tons per load			**17.00**	
Trips per day	4		36.00	
TPD transferred			600	
Tractors	17			
Avail. factor assumed	80%	10	10	Rigs Required per drivers @ avail
Trailers	20			

KEHII LONGHAUL PRODUCTIVITY			
Assumptions with no highway delays	Minutes	Miles	MPH
TS Waste Loading	15		
Travel to Disposal Site	35	23	39.43
Unloading at Disposal (includes queue)	25		
Return to TS	35	23	39.43

Trip #	Activity	Minutes	umulative Min.	Cumulative Hours
1	Prep. and Vehicle Inspection	20	20	0.33
1	TS Waste Loading	15	35	0.58
1	Travel to Disposal Site	35	70	1.17
1	Unloading at Disposal (includes queue)	25	95	1.58
1	Return to TS	35	130	2.17
2	TS Waste Loading	15	145	2.42
2	Travel to Disposal Site	35	180	3.00
2	Unloading at Disposal (includes queue)	25	205	3.42
2	Return to TS	35	240	4.00
3	TS Waste Loading	15	255	4.25
3	Travel to Disposal Site	35	290	4.83
3	Unloading at Disposal (includes queue)	25	315	5.25
3	Return to TS	35	350	5.83
4	TS Waste Loading	15	365	6.08
4	Travel to Disposal Site	35	400	6.67
4	Unloading at Disposal (includes queue)	25	425	7.08
4	Return to TS	35	460	7.67
	Lunch (1 hr) f/9 hrs (or skip for 8 hr)	60	520	8.67
	Total of 2 breaks each day	30	550	9.17
	Additional traffic contingency/day	**110**	660	11.00
	Total Minutes	660		

TRANSFER STATION STAFFING AND EQUIPMENT LEVELS

Kawailoa Transfer Station		TPD ave	60	
		TPD peak	80	
		Oper. Hrs/day	8.5	
		User Dump to one knuckleboom		
Longhaul				
Hvy Truck Driver	3	2	2.0	<required drivers PEAK
Tons per load		**17**	**17**	
Trips per day	3	6	***5.00***	required for typ peak day
TPD transferred		***102***	**80**	Opt set for peak
Hvy Truck Driver	3	2	2.0	
Tons per load		**10**	**17.00**	<required tons for drivers shown
Trips per day	**3**	6	4.00	Required for average day
TPD transferred		60	60	AVE day
Hvy Truck Driver	3		**2.0**	<Set drivers- PEAK day
Tons per load			**13.33**	<Required for peak
Trips per day	3		6.00	
TPD transferred			80	
Tractors	4			
Avail. factor assumed	80%	3	3	Rigs Required per drivers
Trailers	4			

KAWAILOA LONGHAUL PRODUCTIVITY

Assumptions with no highway delays	Minutes	Miles	Ave speed
TS Waste Loading	15		
Travel to Disposal Site	40	28	42
Unloading at Disposal (includes queue)	25		
Return to TS	40	28	42
	120		

Trip #	Activity	Minutes	umulative Min.	Cumulative Hours			
1	Prep. and Vehicle Inspection	20	20	0.33	Extra time for 2 drivers		
1	TS Waste Loading	15	35	0.58	loads	4	6.67
1	Travel to Disposal Site	40	75	1.25	loads	5	4.67
1	Unloading at Disposal (includes queue)	25	100	1.67			
1	Return to TS	40	140	2.33			
2	TS Waste Loading	15	155	2.58			
2	Travel to Disposal Site	40	195	3.25			
2	Unloading at Disposal (includes queue)	25	220	3.67			
2	Return to TS	40	260	4.33			
3	TS Waste Loading	15	275	4.58			
3	Travel to Disposal Site	40	315	5.25			
3	Unloading at Disposal (includes queue)	25	340	5.67			
3	Return to TS	40	380	6.33			
4	TS Waste Loading	15	395	6.58			
4	Travel to Disposal Site	40	435	7.25			
4	Unloading at Disposal (includes queue)	25	460	7.67			
4	Return to TS	40	500	8.33	Three Trips		
	Lunch (1 hr) f/9 hrs (or skip for 8 hr)	60	560	9.33	60	440	7.33
	Total of 2 breaks each day	30	590	9.83	30	470	7.83
	Additional traffic contingency/day	**-50**	540	9.00	**70**	540	9.00
	Total Minutes	540			540		

APPENDIX C

KEEHI TRANSFER STATION

PRELIMINARY ASSESSMENT COMPARING CURRENT

SYSTEM TO INSTALLATION OF PRELOAD COMPACTORS

COMPARE EXISTING COMPCATORS TO NEW PRE-LOAD COMPACTOR TECHNOLOGY

A. **BASIC DATA**	VALUE	UNIT	COMMENTS
TRANSFER TPY	140,000	TONS	
AVERAGE TPD MON - FRI.	450	TONS	
AVERAGE TPD SAT	450	TONS	
ONE WAY HAUL DISTANCE	23	MILES	
AVG. SPEED TO DISPOSAL	40	MPH	
AVG. TOP LOAD PAYLOAD	17.00	TONS	
AVG. COMPACTED LOAD	21.50	TONS	

B. ANNUAL PER MILE OR PER TRUCK LONGHAUL COSTS

ITEM	COST PER MILE	COST PER TRUCK	COMMENT
FUEL AND LUBRICANTS	$0.41		AES FY 96/97 Report
INS., TAX & LICENSE/Vehicle		$8,000	Assume same for both compactor alternatives
VEHICLE MAINTENANCE	$1.00		7/1/97 to 2/11/98 per AES reports
SUBTOTALS	$1.41	$8,000	

C. ESTIMATE ANNUAL EXISTING COMPACTOR SYSTEM TRANSFER COSTS

C-1 ESTIMATE ANNUAL TRANSFER VEHICLE DEBT

CATEGORY	VALUE	UNIT	COMMENTS
TRAVEL TIME TO DISP.	0.58	HR.	35 minutes
TIME AT DISPOSAL	0.42	HR.	20 Minutes
TRAVEL BACK TO TS	0.58	HR.	35 minutes
TOTAL TIME AT TS	0.25	HR.	15 minutes loading
TOTAL ROUND TRIP TIME	1.83	HR.	
DAILY HAUL PRODUCTION	7.50	HR.	8 hrs minus 1/2 hour break
AVG. DAILY TRIPS / TRUCK	4.00	TRIPS	4 trips is current practice (theoretical shown below in italics)
	4.09		
AVG. TRIPS. PER WEEKDAY	26.47	TRIPS	CALC. C5 / C9
VEH. REQ'D. ON WEEKDAYS	6.62	TRUCKS	CALC. C34 / C32
VEH. USED ON WEEKDAYS	7	TRUCKS	ROUND TO NEAREST WHOLE NUMBER
	0.38		Overtime factor (if negative)
AVG. TRIPS PER SAT	26.47	TRIPS	CALC. C6 / C9
VEH. REQ'D. ON SAT	6.62	TRUCKS	CALC. C40 / C34
VEH. USED ON SAT	7	TRUCKS	ROUND TO NEAREST WHOLE NUMBER
	0.38		Overtime factor (if negative)
CAP. COST PER VEH.	$140,000	EA.	BUDGET TRACTOR PLUS TRAILER COST

ANNUAL FLEET MILES	378,824	MILES	CALC. C4 / C9 *C7*2 based on tons
MILES PER YEAR PER VEH.	54,118	TRUCKS	CALC. C43 / C36
TRUCK LIFE	7	YEARS	
ANNUAL DEBT ON TRUCK	$25,900	EA.	7 % INTEREST ON DEBT
ANNUAL FLEET DEBT	$181,300	TRUCKS	

C-2 ESTIMATE ANNUAL DRIVER LABOR COST

DRIVER HOURLY RATE	$17		ASSUMED DRIVER RATE WITHOUT BENEFITS
ST HRS WORKED/YEAR	17,472	HRS.	Theoretical 8hr day X 6 days X # trucks in service
OVERTIME HRS/YR			
DRIVER BENEFITS	40	%	Assumed percentage to include vacation, holiday and fringe
ANNUAL DRIVER COSTS	$415,800		CALCULATION

C-3 ESTIMATED ANNUAL TRANSPORTATION COST

ANNUAL FLEET MILES	378,824	MILES	FROM ABOVE
PER MILE LONGHAUL COST	$1.41		Fuel and Maintenance from AES data 7/1/97 to 2/11/98
NO. VEH. IN FLEET	7		FROM ABOVE
INS., TAX & LICENSE/Vehicle	$8,000		See D21, above
ANNUAL TRANSP. COST	$590,100		Per mile cost X miles plus Per vehicle Tax and Lisence X trucks

C-4 TOT. ANNUAL HAUL COST $1,187,200 CALC. C60+C55+C49

C-5 STATION CAPITAL COSTS

CATEGORY	VALUE	UNIT	COMMENTS
COMPACTORS IN-PLACE	0.00		EXISTING
COST OF COMPACTOR EA	$150,000	7%	Assumes replacement units availabile at this cost
		20	YEARS
DEBT ON COMPACTOR	$0	50%	Assumes no depreciation or capital costs for exsiting units

C-6 **STATION O&M COSTS**

OPER. HRLY RATE	$17		INPUT OPERATOR RATE WITHOUT BENEFITS
HOURS WORKED PER YEAR	10,400	5	TYPICAL CURRENT DAY OPERATORS ASSIGNED
OPERATOR BENEFITS	40	%	Assumed percentage to include vacation, holiday and fringe
ANN. OPER. LABOR COSTS	$247,500		CALCULATION
COMPACTOR UNIT O&M	$25,000	4	ASSUMED UNIT COST OF OPERATION & REPAIR EACH UNIT
ANN. COMPACTOR O&M	$100,000		

C-8 TOTAL ANNUAL TOP LOADIN $1,534,700

TRANSFER COST

D. ESTIMATE ANNUAL PRE-LOAD COMPACTION TRANSFER COSTS

D-1 ESTIMATE ANNUAL TRANSFER VEHICLE DEBT

CATEGORY	VALUE	UNIT	COMMENTS
TRAVEL TIME TO DISP.	0.58	MPH	35 minutes
TIME AT DISPOSAL	0.33	HR.	20 Minutes
TRAVEL BACK TO MRF/TS	0.58	MPH	35 minutes
TOTAL TIME AT MRF/TS	0.33	HR.	15 minutes loading
TOTAL ROUND TRIP TIME	1.83	HR.	
DAILY HAUL PRODUCTION	7.50	HR.	8 hrs minus 1/2 hour break
AVG. DAILY TRIPS / TRUCK	4.00	TRIPS	4 trips is current practice (theoretical shown below in italics)
	4.11		
AVG. TRIPS. PER WEEKDAY	20.93	TRIPS	CALC. C5 / C10
VEH. REQ'D. ON WEEKDAYS	5.23	TRUCKS	CALC. C94 / C92
VEH. USED ON WEEKDAYS	5	TRUCKS	ROUND TO NEAREST WHOLE NUMBER
	(0.23)		Overtime factor (if rounded down)
AVG. TRIPS PER SAT / SUN	20.93	TRIPS	CALC. C6 / C10
VEH. REQ'D. ON SAT / SUN	5.23	TRUCKS	CALC. C98 / C92
VEH. USED ON SAT / SUN	5	TRUCKS	ROUND TO NEAREST WHOLE NUMBER
	(0.23)		Overtime factor (if negative)
CAP. COST PER VEH.	$135,000	EA.	BUDGET TRACTOR PLUS TRAILER COST
ANNUAL FLEET MILES	299,535	MILES	CALC. C4 / C10 *C7*2
MILES PER YEAR PER VEH.	59,907	TRUCKS	CALC. C103 / C96
TRUCK LIFE	7	YEARS	
ANNUAL DEBT ON TRUCK	$25,000	EA.	7 % INTEREST ON DEBT
ANNUAL FLEET DEBT	$125,000	TRUCKS	

D-2 ESTIMATE ANNUAL DRIVER LABOR COST

DRIVER HOURLY RATE	$17		INPUT DRIVER RATE WITHOUT BENEFITS
HOURS WORKED PER YEAR	13,024	HRS.	CALCULATION- inlcude overtime for rounding down (X1.5 hrs)
DRIVER BENEFITS	40	%	INPUT IF DIFFERENT
ANNUAL DRIVER COSTS	$310,000		CALCULATION

D-3 ESTIMATED ANNUAL TRANSPORTATION COST

ANNUAL FLEET MILES	299,535	MILES	FROM ABOVE
PER MILE LONGHAUL COST	$0.97		CURRENT 1.41 REDUCED FOR TRAILERS BY $0.44 ($0.69-0.25)
NO. VEH. IN FLEET	5		FROM ABOVE
INS., TAX & LICENSE/Vehicle	$8,000		Assume same for both compactor alternatives
ANNUAL TRANSP. COST	$330,500		CALCULATION

D-4 TOT. ANNUAL HAUL COST $765,500

D-5 STATION CAPITAL COSTS

CATEGORY	VALUE	UNIT		COMMENTS
NO COMPACTORS REQ'D	2.00			2 ADEQUATE FOR 450 TO 600 TPD
COST OF AMFAB TP-500	$750,000	7%		Cost per unit
		8	YEARS	
DEBT ON COMPACTORS	$251,201.64			INTEREST OVER YEARS SHOWN
ADDIT. STRUCT. WORK	$300,000			Installation & structural work - $150,000 PER COMPACTOR
ANN. DEBT ON STRUCT.	$50,240.33			SAME AS ABOVE % AND YEARS AS AMFAB

D-6 STATION O&M COSTS

COMP. OPER. HRLY RATE	$17			OPERATOR RATE WITHOUT BENEFITS
HOURS WORKED PER YEAR	6,240	3		ASSUMED LOADER OPERATOR USES REMOTE TO RUN COMPACTOR
OPERATOR BENEFITS	40	%		Assumed percentage to include vacation, holiday and fringe
ANN. OPER. LABOR COSTS	$148,500			CALCULATION
COMPACTOR UNIT O&M	$75,000	2		ASSUMED UNIT COST OF OPERATION & REPAIR EACH
ANNUAL COMPACTOR O&M	$150,000			

D-8	**TOTAL ANNUAL PRE-LOAD C**	**$1,365,442**
	TRANSFER COST	

TABLE - KEEHI STATION COST COMPARISON - CURRENT STATION VERSUS TWO PRE-LOAD COMPACTORS

	Current	Pre-load	Key Elements
BASIC SYSTEM VARIABLES			
Transfer Tons per Year	140,000	140,000	Keehi FY 96/97 data
Transfer Tons per day (Average)	450	450	Six day per week operations
One-way Haul Distance	23	23	To H-Power
Average Payload	17.0	21.5	Current versus Optimal Pre-load
Trucks in Service (Average day)	7	5	Service Average day- Does not include spares
Number of Compactors	0	2	Replace existing with 2 AMFAB TP-500
Operations Staff (Typical day)	5	3	Eliminate need for 2 Compactor Operators
ANNUAL COSTS			
Haul Costs			
Fleet Debt	$ 181,300	$ 125,000	Reduction of one transfer truck
Driver Costs	$ 415,800	$ 310,000	Reduction in Driver Hours
Truck O & M Costs	$ 590,100	$ 330,500	Current $1.41/mile reduced to $0.97
Station Capital Costs			
Debt on Compactor	$ -	$ 301,442	Two Pre-load units plus $300K installation work
Operations Labor Cost	$ 247,500	$ 148,500	Typical day reduced from 5 to 3 operators
Compactor Maintenance	$ 100,000	$ 150,000	Four X $50K - Two X $75K for pre-load
TOTAL ANNUAL COST	$ 1,534,700	$ 1,365,442	

From 5 to 3 operators 89%

For 5 operators each case 95% $ 1,464,442 Pre-load, if retaining 2 compactor operators

APPENDIX D

AES COST DATA AND HDR SPREADSHEET COMPUTATION

AVERAGE CURRENT FISCAL YEAR TO DATE COST BY CLASS AND YEAR
AS OF 2/11/98

CLASS CODE 47 - TRAILERS

	YEAR	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
KEEHI (17)						2,786	8,371		4,061	4,778						
WAIPAHU INC. (1)											117					
KAWAILOA (4)												507			327	
KAPAA (13)							3,978		0							

CLASS CODE 51 - WHEEL LOADER

	YEAR	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
KEEHI (6)			(1)				10,794 (2)	18,612 (2)		12,337 (2)						
WAIPAHU INC. (2)		443 1									17					
KAWAILOA (2)		1,532 (1)					2,040 (1)									
KAPAA (5)			311 (1)				14,269 (4)									

AVERAGE CURRENT FISCAL YEAR TO DATE COST BY CLASS AND YEAR
AS OF 2/11/98

CLASS CODE 28 - REAR LOAD REFUSE TRUCK

	YEAR	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
HONOLULU (45)		3,412	3,292	1,834	5,958	7,396	7,720	6,764	11,006	7,981	6,072	9,243				
PEARL CITY (21)		2,396			3,190	876	10,493	5,647		8,542	7,431	8,648				
WAIANAE (5)							4,373	10525		4,366	2,640	6,240				
WAHIAWA (6)							2,281	3,455		0	4,362	6,979				
WAIALUA (4)							3,662	2,446		2,687		3,800				
KAPAA (20)		3,047	1,871		4,481	4,798	9,061	6,609			7,275	3,283				
LAIE (5)		2,108					158			6,642	7,437	4,263				

CLASS CODE 35 - TRUCK TRACTOR

	YEAR	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
KEEHI (15)						2,792		11,255	12,614	9,048	9,147					
KAWAILOA (4)									5,406							
KAPAA (13)								10,949								

AVERAGE CURRENT FISCAL YEAR TO DATE COST BY CLASS AND YEAR
AS OF 2/11/98

CLASS CODE 26 - FRONT END REFUSE TRUCK

	YEAR	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
HONOLULU (2)										13,095	8,427					
PEARL CITY (1)											27,390					
KAPAA (2)										14,278	17,761					

CLASS CODE 27 - AUTOMATED REFUSE TRUCK

	YEAR	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
HONOLULU (20)													21,515	30,877	13,232	260
PEARL CITY (16)										12,299		29,580		19,402	13,473	127
WAIANAE (5)													20,752		16,977	88
WAHIAWA (8)										14,469			19,015		5,395	
KAPAA (8)														14,135	9,290	58
LAIE (2)														8,891	12,496	

CALCULATION TABLE - TRANSFER TRUCK FLEET MAINTENANCE SUMMARY

	Assignments		Current FY to 2/11/98						
	# fleet	yr	# AES	Ave cost/unit	Total Costs shown	Total Costs			
Kapaa									
Tractors									
Kentworth W900B	14	90	13	$ 10,949	$ 142,337				
Open Top Trailer									
Steco AWO4596	12	89	14	$ 3,978	$ 55,692				
						$ 198,029			
Keehi									
Tractors									
International	1	87		$ -	$ -				
Ford	3	88	3	$ 2,792	$ 8,376	check $8482	$ 1,176.67	data spot check	
Kentworth	3	90	2	$ -	$ -				
Peterbilt 379	3	90	3	$ 11,255	$ 33,765				
Peterbilt	2	91	2	$ 12,614	$ 25,228				
Peterbilt	3	92	3	$ 9,046	$ 27,138				
Kentworth 900B	2	93	2	$ 9,147	$ 18,294				
	17		15	$ 6,962	$ 104,425				
Trailers									
East 40' Alum	1	88	1	$ 2,785	$ 2,785				
East 40' Alum	6	89	6	$ 6,371	$ 38,226				
East 40' Alum	4	91	4	$ 4,051	$ 16,204				
East 40' Alum	9	92	9	$ 4,778	$ 43,002				
	20		17	$ 5,895	$ 100,217				
						$ 204,642			
Kawailoa									
Tractors									
Peter built	4	91	4	$ 5,406	$ 21,624				
Open Top Trailer									
Star	1	94	1	$ 507	$ 507				
	3	96	3	$ 327	$ 981				
	4		4	$ 372	$ 1,488				
						$ 23,112			
							Total Costs sh	Ann Cost	
Total tractor for all sites					$ 8,387	$ 268,386	$ 14,378	$ 460,090	
Total trailer for all sites					$ 4,497	$ 157,397	$ 7,709	$ 269,823	
TOTAL TRACTOR AND TRAILER FOR ALL SITES= SUM					$ 12,884	$ 425,783	$ 22,087	$ 729,914	116%
				171%			*FY 96/97*	*$ 628,800*	

AES Maintenance - Longhaul Cost per Mile (7/97 to 2/11/98 report)

Fuel and Maint.	Kapaa	Keehi	Kawailoa				
Prorated Miles to 2/98	201,416	145,131	32,980	379,528	*AES FY 1996/97*	*$ 650,619*	*miles X 7/12*
Maint Cost to 2/11/98	$ 198,029	$ 204,642	$ 23,112	$ 425,783	*From cost tables by class and year from AES as analyzed above*		
Split	47%	48%	5%	100%	*Calculation*		
Cost per mile	$ 0.98	$ 1.41	$ 0.70	$ 1.12	*Calculation*		
Trailer Costs/Mile	$ 0.28	$ 0.69	$ 0.05	$ 0.41	*Calculation from calculation table , above*		
Tractor Cost/Mile	$ 0.71	$ 0.72	0.66	0.71	*Calculation from calculation table , above*		
Deduct Fuel Cost/Mile	$ 0.41	$ 0.41	$ 0.41	$ 0.41	*Average from FY 96/97 AES data*		
Maint only Cost/mile	$ 0.57	$ 1.00	$ 0.29	$ 0.71	*Calculation*		
Split on Maint. Only	43%	54%	4%	$ 268,387	*Calculation*		

Comparison of Transfer Truck Fuel & Maintenance Costs and Miles and Tons

Cost Source: AES - Average Current Fiscal Year to Date Cost By Class and Year as of 2/11/98

	Kapaa	Keehi	Kawailoa	
round-trip Miles	72	46	56	
Total Miles	53%	38%	9%	100%
Tons	44%	48%	8%	100%
Tractor	53%	39%	8%	100%
Trailer	35%	64%	1%	100%
Total Truck	47%	48%	5%	100%

Comparison of Maintenance Costs

Cost Source: AES - Average Current Fiscal Year to Date Cost By Class and Year as of 2/11/98

	Kapaa	Keehi	Kawailoa	
Transfer Trucks	$ 198,029	$ 204,642	$ 23,112	$ 425,783
Loaders	$ 57,387	$ 79,486	$ 3,572	$ 140,445
Comparison	40.9%	56.6%	2.5%	100%